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Form 801A

U. S. DEPARTMENT OF COMMERCE
STEAMBOAT INSPECTION SERVICE

GENERAL RULES AND REGULATIONS

PRESCRIBED BY THE

BOARD OF SUPERVISING INSPECTORS

OCEAN AND COASTWISE

APRIL 1, 1930

Library
Pacific Salmon Investigations
U. S. Fish & Wildlife Service
Seattle, Washington.

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BOARD OF SUPERVISING INSPECTORS

AS AMENDED AT BOARD MEETING
OF JANUARY, 1930

▽

EDITION : APRIL 1, 1930

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AMENDED STEAMBOAT INSPECTION RULES AND REGULATIONS, OCEAN AND COASTWISE.

The General Rules and Regulations prescribed by the Board of Supervising Inspectors are divided into four books, namely, (1) Ocean and coastwise, (2) Great Lakes, (3) Bays, sounds, and lakes other than the Great Lakes, and (4) Rivers.

This book contains the ocean and coastwise rules.

Rule III herein is divided into two parts, "Ocean" and "Coastwise."

This edition contains all amendments of the ocean and coastwise rules and regulations made by the Board of Supervising Inspectors at the meeting of January, 1930, and by the executive committee of the board at the meetings of March 18, June 15, July 18–19, and July 31, 1929, published in the forty-sixth supplement to General Rules and Regulations. This edition also contains lists of all approved vessel equipments.

The amendments of the rules and regulations above referred to have been approved by the Secretary of Commerce, and have the force of law, under the provisions of section 4405, Revised Statutes, and shall be observed accordingly.

OFFICERS OF THE STEAMBOAT INSPECTION SERVICE.[1]

DICKERSON N. HOOVER, *Supervising Inspector General,*
JOHN G. DUDLEY, *Deputy Supervising Inspector General,*
A. E. KEYSER, *Administrative Assistant to the Supervising Inspector General.*

Washington, D. C.

Traveling inspectors in office of Supervising Inspector General.—Earl B. Hull, Harry W. Ravens, Chester W. Willett, James W. Wilson, John F. Oettl, Halert C. Shepheard.

Clerks in office of Supervising Inspector General.—Gertrude F. Brown, Frederick J. de Moll, Ida E. Barnhart, Lillian O. Bernard, Gertrude M. Goll, Mary R. Matheny, Helen E. Morris, Adelaide E. Borah, Emily L. Happel, Pearl M. Sorber, Helen V. Simonson, Irene I. Clawson.

Messenger.—Alfred D. Clarke.

SUPERVISING INSPECTORS.

First district.—John K. Bulger, San Francisco, Calif.
Second district.—John L. Crone, New York, N. Y.
Third district.—Alexander O. Calcott, Norfolk, Va.
Fourth district.—Alvah O. Day, St. Louis, Mo.
Fifth district.—Oscar G. Haines, Boston, Mass.
Sixth district.—George M. Green, Louisville, Ky.
Seventh district.—Harry Layfield, Pittsburgh, Pa.
Eighth district.—Fred J. Meno, Detroit, Mich.
Ninth district.—Nils B. Nelson, Cleveland, Ohio.
Tenth district.—Cecil N. Bean, New Orleans, La.
Eleventh district.—William Fisher, Seattle, Wash.

ASSISTANT INSPECTORS TESTING MARINE BOILER MATERIAL AT MILLS.

Charles W. Beach, Chicago, Ill.
Roy B. Huston, Cleveland, Ohio.
Richard K. Griswold, Coatesville, Pa.
Samuel A. Mills, Philadelphia, Pa.
Washington E. Bryan, Pittsburgh, Pa.

LOCAL INSPECTORS.

District.	Port.	Of hulls.	Of boilers.
First	San Francisco, Calif.	Frank H. Turner	Joseph P. Dolan.
	Do	Charles F. Herriman, assistant	Winslow D. Conn, assistant.
	Do	Charles F. Austin, assistant	Henry V. Barbieri, assistant.
	Do	Thomas J. Sullivan, assistant	Charles T Tiernan, assistant.
	Do	John P. Tibbetts, assistant	Charles J. McDonald, assistant.
	Do	Axel R. Cahling, assistant	Ralph M. Robison, assistant.
	Do	Frank G. Bucknam, assistant	Herman Rorquist, assistant.

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[1] List of officers corrected to Apr. 1, 1930.

Local inspectors—Continued.

District.	Port.	Of hulls.	Of boilers.
First (con.)	Honolulu, Hawaii	Robert T. Bain	Clarence King.
	Los Angeles, Calif	Samuel A. Kennedy	Joseph A. Moody.
	Do	John Dahl, assistant	James, F. Smith, assistant.
	Do	Ralph W. McNelley, assistant	Thomas J. Heeney, assistant.
	Portland, Oreg	Frank X. Edthofer	John E. Wynn.
	Do	Hagen F. C. Astrup, assistant	Frank N. Rogers, assistant.
	Do	Frederick A. MacGurn, assistant	George Q. Weldin, assistant.
Second	New York, N. Y	George T. Charlton	William H. Powers.
	Do	Joseph Watkinson, assistant	George L. Scheer, assistant.
	Do	Hector R. Campbell, assistant	John B. Riley, assistant.
	Do	Walter E. Disley, assistant	James Smith, assistant.
	Do	John J. Grady, assistant	Allen D. Fitzgerald, assistant.
	Do	Charles M. Bunce, assistant	Frederick L. Dennis, assistant.
	Do	George M. Francisco, assistant	William G. Fenwick, assistant.
	Do	Whidden A. Harvey, assistant	Patrick J. Hunt, assistant.
	Do	Henry Wellman, assistant	Frank Kelly, assistant.
	Do	Thomas F. Dalton, assistant	John L. Moran, assistant.
	Do	Edward Keane, assistant	Matthew Sloan, assistant.
	Do	Albert E. Redifer, assistant	John W. Waters, assistant.
	Do	James H. Bethel, assistant	Philip J. O'Reilly, assistant.
	Do	Thomas H. Foster, assistant	Howard C. Bridges, assistant.
	Do	Cornelius H. Smith, assistant	Richard K. Griswold,[1] assistant.
	Do	Joseph T. Drake, assistant	Thomas J. Haley, assistant.
	Do	Frank N. Bruning, assistant	Edmund J. Martin, assistant.
	Do	William M. McGuire, assistant	John M. Goddin, assistant.
	Albany, N. Y	Thomas E. Norton	Nathan H. Dunn.
	Do	Andrew J. Kelley, assistant	Thomas J. Riley, assistant.
	New Haven, Conn	Alva R. Chapman	Harvey C. Colgin.
	Philadelphia, Pa	Redford A. Sargent	John E. Wilson.
	Do	A. T. Rudolph Berger, assistant	James H. Durborough, assistant.
	Do	Frank H. Demke, assistant	Christian C. Stricker, assistant.
	Do	George H. Toon, assistant	Harvey K. Carter, assistant.
	Do	Harry S. Miller, assistant	M. Alexander Monsell, assistant.
	Do	John R. Borum, assistant	Edgar T. West, assistant.
	Do	Ralph A. Pruett, assistant	Samuel A. Mills, assistant.
Third	Norfolk, Va	John E. Tarkenton	Thomas J. Hanlon.
	Do	William B. Hogg, assistant	William H. Sebrell, assistant.
	Do	Howard E. Simmons, assistant	Charles P. Etheridge, assistant.
	Do	Walter N. Marshall, assistant	Burton C. Stiff, assistant.
	Do	Raymond C. Vose, assistant	Ross G. Willoh, assistant.
	Baltimore, Md	Paul H. Tyler	David C. Young.
	Do	Young D. Griffiss, assistant	John T. Loveless, assistant.
	Do	John M. Wheeler, assistant	John Milne, assistant.
	Do	Jesse B. Reynolds, assistant	John W. S. Murphy, assistant.
	Do	Osborn H. Simmons, assistant	John W. Banks, assistant.
	Charleston, S. C	Frank Comforter	Frank L. Jenkins.
	Jacksonville, Fla	Spencer L. Houston	John H. Nolan.
	Savannah, Ga	William G. Lee	Henry H. Hay.
	Do	George J. Brill, assistant	Howard Leigh, assistant.
Fourth	St. Louis, Mo	George B. Gordon	Frederick R. Kay.
	Dubuque, Iowa	George B. Knapp	Harrison M. Suiter.
Fifth	Boston, Mass	Charles Lyons	John Stewart.
	Do	Olaf B. Borgeson, assistant	John Barrett, assistant.
	Do	Erwin G. Schwendig, assistant	George W. Callbeck, assistant.
	Do	Charles F. Fornason, assistant	Charles W. Russell, assistant.
	Bangor, Me	Lorenzo M. Crowell	Silas M. Boothby.
	New London, Conn	John A. MacDonald	John A. Brooks.
	Portland, Me	Osmyn Berry	Walter L. Blaisdell.
	Do	Manly F. Littlefield, assistant	William B. Young. assistant.
	Providence, R. I	Robert B. Clark	Richard F. Bailey.
	Do	William F. Driscoll, assistant	James F. Rawdon, assistant.
	Do	Frederick S. Walker, assistant	Robert E. Coombs, assistant.
Sixth	Louisville, Ky	Edward Maurer	Isaac W. Betts.
	Evansville, Ind	James V. Sproule	Baylor Spratt.
	Memphis, Tenn	John B. Wyckoff	Charles T. Greenwood.
	Nashville, Tenn	William T. Hunter	William P. Fiske.
Seventh	Pittsburgh, Pa	Edward L. Shaw	George E. Berry.
	Do		Washington E. Bryan, assistant.
	Cincinnati, Ohio	Benjamin I. Pattison	George W. Dameron.
	Point Pleasant, W. Va.	Harry H. Pullem	Charles G. Thomas.
Eighth	Detroit, Mich	William T. Kiel	William H. Dungan.
	Do	George Cummings, assistant	Albert C. Kelke, assistant.
	Do	Robert H. Sturtridge, assistant	Hugh Kelly, assistant.
	Chicago, Ill	Peter Larson	William Nicholas.
	Do	Edward J. Fitzgerald, assistant	Thomas R. Martin, assistant.
	Do	Petter G. Pettersen, assistant	Charles W. Beach, assistant.
	Duluth, Minn	Dennis T. Sullivan	Neil Patterson.
	Grand Haven, Mich	Bernard J. Gellick	Hugh P. Mulligan.
	Do	Peter Thompson, assistant	Edgar G. Ewing, assistant.
	Marquette, Mich	John H. Hansen	Alfred G. Knights.
	Milwaukee, Wis	Frank W. Van Patten	William A. Collins.

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[1] Detailed to Coatesville, Pa.

Local inspectors—Continued.

District.	Port.	Of hulls.	Of boilers.
Eighth(con)	Milwaukee, Wis.	Henry Erichsen, assistant	James McK. Hunter, assistant.
	Do	Michael J. Kentos, assistant	Abraham Auld, assistant.
	Port Huron, Mich.	Cyril E. Bowerman	Walter Greenwood.
Ninth	Cleveland, Ohio	Thomas W. Gould	Silas H. Hunter.
		William H. Stern, assistant	Roy B. Huston, assistant.
		Frank J. McCarty, assistant	Robert H. Benham, assistant.
		David A. Curran, assistant	Charles A. Tyler, assistant.
	Buffalo, N. Y.	James M. Todd	William P. Nolan.
	Do	John A. Connelly, assistant	John W. Mark, assistant.
	Do	Iver Rolseng, assistant	William T. Smith, assistant.
	Do	Moses Boggan, assistant	Byron A. Minor, assistant.
	Oswego, N. Y.	Joseph C. Dobson	Albert C. Brockner.
	Toledo, Ohio	Henry Johnson	Wallace Tomey.
	Do	Kolbjorn Hansen, assistant	Magnus E. Schladetsch, assistant.
Tenth	New Orleans, La.	Samuel O. Larche	James B. Cobb.
	Do	Everett B. Thomas, assistant	Francis W. Sadler, assistant.
	Do	Martin M. Sorenson, assistant	Alexander S. Gassaway, assistant.
	Do	James H. Willey, assistant	Walter R. Watson, assistant.
	Galveston, Tex.	Andrew A. Miranda	Hugha F. Cobb.
	Do	William H. Yent, assistant	Paul A. Larche, assistant.
	Mobile, Ala.	Henry O. Lueders	Thomas W. Reynolds.
	Do	Frederick W. Richardson, assistant.	John C. Houston, assistant.
	San Juan, P. R.	Virgil Baker,	Henry J. McCabe.
	Tampa, Fla.	John R. Blair	John W. Sullivan.
Eleventh	Seattle, Wash.	Donald S. Ames	Thomas Short.
	Do	Arthur Joachims, assistant	Samuel W. Thorn, assistant.
	Do	Martin J. Taaffe, assistant	Richard G. Robinson, jr., assistant.
	Do	Daniel B. Hutchings, assistant	William M. Campbell, assistant.
	Do	Francis Kelly, assistant	Herbert E. Peters, assistant.
	Do	Edward Stuart, assistant	
	Hoquiam, Wash.	George Tyler	Whitmore D. Hill.
	Juneau, Alaska	George W. Morgan	John Newmarker.
	St. Michael, Alaska	Charles H. White	Savine L. Craft.

CLERKS TO LOCAL BOARDS.

Ambrose A. Clarke, San Francisco, Calif.
Daisy I. Denis, San Francisco, Calif.
James J. Robins, San Francisco, Calif.
Thelma D. Hall, San Francisco, Calif.
Elva S. Thomas, San Francisco, Calif.
Susan L. Fountain, Honolulu, Hawaii.
James J. Sullivan, Los Angeles, Calif.
Clara M. Larsen, Los Angeles, Calif.
Arthur F. Merrill, Portland, Oreg.
Blanche E. Solyan, Portland, Oreg.
Thomas B. Martin, New York, N. Y.
William C. Osborne, New York, N. Y.
Frank Dunlea, New York, N. Y.
Benjamin Kohn, New York, N. Y.
Charles Di Giovanna, New York, N. Y.
Sophie Shapiro, New York, N. Y.
Valentine Donovan, New York, N. Y.
Robert Johenning, New York, N. Y.
William Kanzler, New York, N. Y.
Irving Witkowsky, New York, N. Y.
Benjamin Feldman, New York, N. Y.
Molly Groll, New York, N. Y.
Aaron Roemer, New York, N.Y.
Daniel J. Kelly, Albany, N. Y.
Lillian R. Simon, Albany, N. Y.
Peter W. Hanbury, New Haven, Conn.
Joseph R. Koffel, Philadelphia, Pa.
Dora Kramer, Philadelphia, Pa.
Max Abrams, Philadelphia, Pa.
George M. Kitzmiller, Norfolk, Va.
William G. Collings, Norfolk, Va.
Ruby Matthews, Norfolk, Va.
Evelyn E. Tillman, Baltimore, Md.
Christina Grabau, Baltimore, Md.
Jeannette Briskman, Baltimore, Md.
Ruth S. Woodword,[1] Baltimore, Md.
Anna C. Scott, Charleston, S. C.
Norma Davenport, Jacksonville, Fla.
Marie C. Salas, Savannah, Ga.
Frances Pursell, St. Louis, Mo.
Hellen M. Ham, Dubuque, Iowa.
Edward L. Sullivan, Boston, Mass.
Mary F. Cain, Boston, Mass.
Catherine V. O'Neill, Boston, Mass.
Raymond A. Grady, Bangor, Me.
Matthew C. Graham, New London, Conn.
William H. O'Brion, Portland, Me.
Edmund P. Walker, Portland, Me.
Rose S. Melone, Providence, R. I.
Anna E. Cahir, Providence, R. I.
Lora J. Burtt, Louisville, Ky.
Leonora Veneman, Evansville, Ind.
John E. Kirkpatrick, Nashville, Tenn.
Helen J. Hamlin, Memphis, Tenn.
Alice Lilly, Pittsburgh, Pa.
Augustus W. Snyder, Cincinnati, Ohio.
William E. Monroe, Point Pleasant, W. Va.

[1] Detailed to Coatesville, Pa.

Ruth F. Kelly, Detroit, Mich.
Mary R. Stefanich, Detroit, Mich.
Goldie H. Weinstein, Detroit, Mich.
Arthur E. Schutt, Chicago, Ill.
Grace Mead, Chicago, Ill.
Donald McLennan, Duluth, Minn.
Elmer C. Hurless, Grand Haven, Mich.
Anna L. Forsberg, Marquette, Mich.
Lee R. Whitney, Milwaukee, Wis.
Christine C. Baumstark, Milwaukee, Wis.
Myrtle V. Coulthard, Port Huron, Mich.
Mabel L. Thompson, Cleveland, Ohio.
Eva D. Lozier, Cleveland, Ohio.
Gertrude Ernstein, Cleveland, Ohio.
Margaret E. Duley, Cleveland, Ohio.
Pauline E. Flynn, Buffalo, N. Y.
Josephine R. Lillis, Buffalo, N. Y.
Margaret M. Quinlivan, Buffalo, N. Y.
Coridon F. Barlow, Oswego, N. Y.
Edward M. Mansuy, Toledo, Ohio.
George J. West, New Orleans, La.
Claire M. Lawton, New Orleans, La.
Dorathea Fielder, New Orleans, La.
Joseph G. Sherfy, Galveston, Tex.
John B. Clark, Mobile, Ala.
Percy J. McCarron, Mobile, Ala.
Jose R. Arzuaga, San Juan, P. R.
Avis V. McCaskill, Tampa, Fla.
Wesley E. Walker, Seattle, Wash.
Edna M. Lappin, Seattle, Wash.
Lydia Knaak, Seattle, Wash.
Elizabeth Altmannsperger, Seattle, Wash.
Maude M. Porter, Hoquiam, Wash.
Le Roy J. Vestal, Juneau, Alaska.
James Trail, St. Michael, Alaska.

TERRITORY EMBRACED IN SUPERVISING DISTRICTS.

First district embraces all the waters of the United States west of the Rocky Mountains and south of a line drawn east from Cape Disappointment to the intersection of the forty-seventh parallel of north latitude and longitude 112° 30′ west, and the Hawaiian Islands.

Second district embraces all the waters of Long Island Sound west of the Connecticut River and the tributaries thereto, that portion of Long Island lying west of Riverhead, and the waters of the Atlantic coast, rivers, and tributaries from Long Island to Cape Charles, and Lake Champlain and its tributaries.

Third district embraces the waters of the Atlantic coast, rivers, and tributaries between Cape Charles and Cape Sable.

Fourth district embraces the Mississippi River and tributaries from above Greenfield, Mo., to the head of navigation on the Missouri River, and to the head of navigation on the Illinois River.

Fifth district embraces the waters of the Atlantic coast, rivers, and tributaries from the eastern boundary of the United States to and including the Connecticut River, and that portion of Long Island east of and including Riverhead.

Sixth district embraces the Ohio River and tributaries up to and including Carrollton, Ky., and the Mississippi River and tributaries from Greenville, Miss., up to and including Greenfield, Mo.

Seventh district embraces the Ohio River and tributaries above Carrollton, Ky.

Eighth district embraces all the waters of the Great Lakes north and west of Lake Erie with their tributaries.

Ninth district embraces all the waters of the River St. Lawrence, Lakes Erie and Ontario and their tributaries.

Tenth district embraces the coast and tributary waters of the Gulf of Mexico, between Cape Sable and the mouth of the Rio Grande, and the Mississippi River and tributaries to Greenville, Miss., and Porto Rico.

Eleventh district embraces all the waters in the States of Washington, Idaho, and Montana north of a line drawn east from Cape Disappointment to the intersection of the forty-seventh parallel of north latitude and longitude 112° 30′ west, and also all United States waters in the Territory of Alaska.

GENERAL RULES AND REGULATIONS.

OCEAN AND COASTWISE.

RULE I.—BOILER PLATE.

STAMPS.

1. Every iron or steel plate intended for the construction or repairs of boilers to be used on steam vessels shall be stamped by the manufacturer in the following manner, at two diagonal corners, at a distance of about 18 inches from the edges.

Plates to be used in externally fired boilers the thickness of which shall not exceed one-half inch for steamers navigated under the provisions of Title LII, Revised Statutes, which will be subject to tensile strain in said boilers, shall be tested and inspected by an inspector duly authorized under the provisions of said title, and such plates shall not be stamped until they have been tested by the inspector, and each of such plates shall then be stamped by the manufacturer in the presence of the inspector with the name of the manufacturer, the place where manufactured, and the minimum number of thousand pounds tensile stress it will bear to the sectional square inch as has been determined by the test.

Plates to be used in the construction or repair of boilers other than the externally fired boilers as described in above paragraph, for steamers navigated under provisions of Title LII, Revised Statutes, which shall be subject to tensile strain in said boilers shall be tested and inspected by an inspector duly authorized under provisions of said title and such plates shall be stamped by the manufacturer before same are tested with the name of the manufacturer, the place where manufactured, and the minimum number of pounds the plate will bear to the sectional square inch, expressed in thousands.

Inspectors testing iron or steel plate at the mills where same is manufactured shall allow the mills to shear any plate into butt straps or heads before the coupon from the plate is tested, and they shall accept the statement of the manufacturer that the coupon presented to the inspector for testing was taken from the plate from which the butt straps or heads were cut, and if the coupon meets all the requirements of Rule I, the inspector shall stamp, in one place where it is most likely to be left legible after working into the boiler, all heads and butt straps cut from the plate.

All plates which conform to the physical, chemical, and other requirements prescribed by these rules shall be stamped by the inspector near the manufacturer's stamp, with the official stamp of the United States Steamboat Inspection Service, and with the initials of his name and a serial number. (Sec. 4430, R. S.)

2. Plates may be tested and inspected at the mills for repairs to marine boilers or to be carried in stock, the report of such test to be in duplicate, one copy to be furnished through the supervising inspector to the local inspectors in the district where the purchaser of such material is located, and the other to the purchaser, who shall deliver a copy of the same to the parties using the material, who, in turn, shall submit the same to the local inspectors in the district where the material is to be used, before being assembled in the boiler. Steamers carrying such repair material to be used in emergencies shall carry the record of each sheet of such material on board. (Secs. 4430, 4431, R. S.)

3. Boilers built since February 28, 1872, of material stamped and tested according to the requirements of section 4430, Revised Statutes, and having a record thereof in the office of the local inspectors in the district where the boiler was built or intended to be used, may be used for marine purposes, notwithstanding that such boilers may have been used for other purposes, if in the judgment of the local inspectors they are deemed safe. (Sec. 4430, R. S.)

CHEMICAL PROPERTIES, STEEL PLATES.

4. Steel plates shall be made by the open-hearth process, except that steel for plates to be used in the manufacture of boiler tubes may be made by the Bessemer process.

Open-hearth steel shall contain not more than 0.04 per cent of phosphorus nor more than 0.05 per cent of sulphur.

The manufacturer shall furnish the inspector, with each order tested, a certificate stating the process by which the steel was manufactured and a copy of the analysis of each melt. The analysis may, if deemed expedient by the Supervising Inspector General, be verified at the expense of the manufacturer. (Secs. 4405, 4430, R. S.)

PHYSICAL PROPERTIES, STEEL PLATES.

5. All steel plates tested shall show an elongation of at least 20 per cent measured in a gauge length of 8 inches. (Sec. 4430, R. S.)

PHYSICAL PROPERTIES, IRON PLATES.

6. The tensile strength shall be not less than 45,000 pounds per square inch. The elongation shall be not less than 15 per cent. The reduction of area shall be not less than 15 per cent for 45,000 pounds tensile strength, and for each increase of 1,000 pounds tensile strength up to 55,000 pounds, an addition of 1 shall be made to the required percentage of reduction of area. The bend test specimen shall bend cold through 90° around a curve the radius of which is not greater than one and one-half times the thickness of the specimen. (Sec. 4430, R. S.)

7. All tension test specimens shall be milled to the form as shown in figure 1, with the following dimensions: Length at least 16 inches, ends from 1½ to 3½ inches wide by about 3 inches in length, and parallel section at center 1 to 1½ inches wide by 9 inches in length. The percentage of elongation shall be measured in a gauge length of 8 inches.

Where specimens are to be tested on the testing machines of the Steamboat Inspection Service, they shall be 1 inch wide at parallel section in center, and shall not exceed 2 inches in width on the ends.

All bend test specimens shall be at least 12 inches in length and from 1 to 3½ inches in width, and the full thickness as rolled. The edges may be planed. The corners shall not be rounded, but the sharpness may be removed with a fine file. After bending, the specimens shall show no cracks or flaws on the outside of the bent portion.

TEST SPECIMENS FOR STEEL PLATES.

Two tension tests and one cold-bend test shall be made from each plate as first rolled from a billet, slab, or ingot, the tensile test specimens to be taken from two diagonal corners of the plate, and a cold-bend specimen to be taken transversely from the middle of the top of the plate.

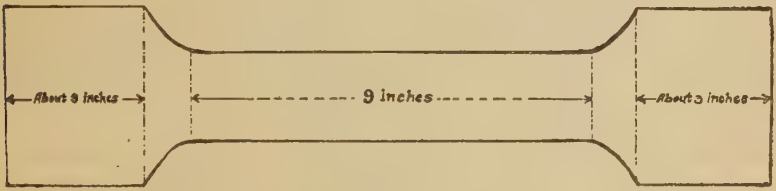


FIGURE 1.

The bend test specimen shall bend cold 180° around a pin without showing any sign of cracking or other injurious defects on the outside of the bent portion, as follows: For plates under 1 inch in thickness the diameter of the pin shall be equal to one and one-half times the thickness of the plate; for plates 1 inch and over, up to and including 1½ inches in thickness, the diameter of the pin shall be equal to three times the thickness of the plate, and for all plates over 1½ inches in thickness the diameter of the pin shall be equal to four times the thickness of the plate.

The finished material shall be free from all injurious defects, and shall have a good and workmanlike finish.

All measurements of test specimens and material shall be made by any standard American gauge, and record of tests shall be submitted on Form 934. (Secs. 4405, 4430, R. S.)

8.

[Form 935.]

AFFIDAVIT OF MANUFACTURER OF MARINE STEAM BOILERS CONSTRUCTED OF MATERIAL TESTED AT THE MILLS.

DEPARTMENT OF COMMERCE,
STEAMBOAT INSPECTION SERVICE.

STATE OF ———, *County of* ———.

On this —— day of ———, A. D. 192—, personally appeared before me, ——— ———, a notary public in and for the county of ——— and State of ———, Mr.——— ———, who deposes and says that he is ——— ———, of ——— ———, boiler manufacturer, and has contracted to build — marine boiler– for ——— ———, of ——— ———, from ——— plate manufactured by ——— ———, of ——— ———, which plate was tested at the mills by a United States assistant inspector, as provided in the act of Congress approved January 22, 1894, each of said plates having stamped thereon the words "U. S. Assistant Inspector" and the initials, — —, and numbered as follows: ———.

No plate for shell or other part of boiler subject to tensile strain, other than herein specified, will be used in the construction of said boiler–, the lowest tensile strength stamped thereon being ——— pounds.

The dimensions of the boiler– will be: Length, ———; diameter, ———.

	Material.	Number.	Length.	Thickness.	Diameter.
Tubes					
Flues					
Furnaces					

Kind of furnaces, ——; round, ——; corrugated, ——; flat sides, ——. Thickness of plates of cylindrical shell of boiler, ——; thickness of side sheets in flat side of furnace, ——; thickness of flat top sheet of back connection, ——; thickness of plates of cylindrical shell of back connection, ——; thickness of material of boiler heads, ——; thickness of tube sheets, ——; thickness of plates of shell of steam chimney, ——; thickness of plates in lining of steam chimney, ——; thickness of side sheets, ——. Kind of rivets (iron or steel), ——; diameter of rivet holes, ——; pitch of rivets, ——. All rivet holes of boiler–, including steam and mud drums, will be fairly drilled and no part of such holes will be punched, ———; or punched, ———. All tubes used in the construction of said boiler–, are of the thickness and material required by, and have met all the other requirements of, the rules of the Board of Supervising Inspectors, as shown by statement of the manufacturer of the tubes. Steam pressure for which boiler —— to be inspected, —— pounds. Style of boiler, ——. Boiler– to be installed upon the steamer ———.

Signature: ——— ———.

Subscribed and ——— to before me this —— day of ———, 192—.
(Sworn or affirmed.)

[NOTARY'S SEAL.]

——— ———,
Notary Public.

NOTE.—Inspectors will not accept this affidavit without the data required, unless accompanied by a satisfactory explanation in writing, to be filed with the affidavit.

(Sec. 4405, R. S.)

9.

[Form 936.]

AFFIDAVIT OF MANUFACTURER OF MARINE STEAM BOILERS.

DEPARTMENT OF COMMERCE,
STEAMBOAT INSPECTION SERVICE.

STATE OF ———, *County of* ———.

On this —— day of ———, A. D. 192—, personally appeared before me, ——— ———, a notary public in and for the county of ——— and State of ———, Mr. ——— ———, who deposes and says that he is ——— ———, of ——— ———, boiler manufacturer, and that the accompanying samples of ———, manufactured by ——— ———, of ——— ———, were cut from plates which are to be used in the construction of —— marine boiler– for ———, of ———, and no plate for shell or other part of boiler subject to tensile strain of less tensile strength or quality than that determined by the United States inspector who made the tests, which lowest tensile strength found was ——— pounds, will be used in the construction of said boiler–, the dimensions of which will be: Length, ———; diameter, ———.

	Material.	Number.	Length.	Thickness.	Diameter.
Tubes					
Flues					
Furnaces					

Kind of furnaces, ——; round, ——; corrugated, ——; flat sides, ——. Thickness of plates of cylindrical shell of boiler, ——; thickness of side sheets in flat side of furnace, ——; thickness of flat top sheet of back connection, ——; thickness of plates of cylindrical shell of back connection, ——; thickness of material of boiler heads, ——; thickness of tube sheets, ——; thickness of plates of shell of steam chimney, ——; thickness of plates in lining of steam chimney, ——; thickness of side sheets, ——. Kind of rivets (iron or steel), ——; diameter of rivet holes, ——; pitch of rivets, ——. All rivet holes of boiler–, including steam and mud drums, will be fairly drilled and no part of such holes will be punched, ———; or punched, ———. All tubes used in the construction of said boiler– are of the thickness and material required by, and have met all the other requirements of, the rules of the Board of Supervising Inspectors, as shown by statement of the manufacturer of the tubes. Steam pressure for which boiler —— to be inspected, —— pounds. Style of boiler, ——. Boiler to be installed upon the steamer ———.

Signature: ——— ———.

Subscribed and ——— to before me this —— day of ———, 192—.
(Sworn or affirmed.)

[NOTARY'S SEAL.] ——— ———,
Notary Public.

NOTE.—Inspectors will not accept this affidavit unless the data required are given, unless accompanied by a satisfactory explanation in writing, to be filed with the affidavit.

Inspectors may make requisition on the Department for the necessary supply of blank affidavits for the use of boiler manufacturers. (Sec. 4405, R. S.)

FOREIGN-BUILT BOILERS.

10. Boilers of foreign-built vessels admitted to American registry shall be inspected in the same manner as boilers on American vessels.

The working steam pressure shall be determined by the application of the hydrostatic pressure in the ratio as required by the laws of the United States and by a close observation of the general condition of the boiler.

The working steam pressure under which the boilers are being operated shall be accepted as the basis for determining the allowable working pressure where it is not practicable or possible to secure a record of the tests of the plates entering into the construction of the boiler. (Sec. 4405, R. S.)

RULE II.—BOILERS AND ATTACHMENTS.

DRAWINGS OF BOILERS.

1. The manufacturer of any boiler to be used for marine purposes shall furnish the inspectors of the district where such boiler or boilers are to be inspected duplicate blue prints or tracings fully descriptive of same in detail for their approval, one of which shall be kept on file in the office of the local inspectors and the other returned to the manu-

facturer. Where more than one boiler is made from a similar design, a drawing of which is on file in the local inspector's office, if made at a different date, a reference to such drawing on file is all that shall be required. The manufacturer shall also furnish the inspectors an affidavit on either Form 935 or 936, as contained in sections 8 and 9 of Rule I.

It shall be the duty of every local inspector of boilers to make, for every new boiler inspected in his district, all computations required by the rules and regulations, and any other necessary computations, from data obtained from blue prints or tracings, boiler manufacturers' affidavits, tensile test reports, and from other reliable sources. A record of such computations in full shall be made on letter sheets and filed with blue prints or tracings of boiler, the first sheet of such computations to be headed with a general description of boiler and with the vessel file number. (Secs. 4405, 4418, R. S.)

CYLINDRICAL SHELLS.

2. The working steam pressure allowable on cylindrical shells of boilers constructed of plates inspected as required by these rules, when single riveted, shall not produce a strain to exceed one-sixth of the tensile strength of the iron or steel plates of which such boilers are constructed; but where the longitudinal laps of the cylindrical parts of such boilers are double riveted, and the rivet holes for such boilers have been fairly drilled instead of punched, an addition of 20 per cent to the working pressure provided for single riveting shall be allowed.

The pressure for any dimension of boilers shall be ascertained by the following rule, viz:

Multiply one-sixth of the lowest tensile strength found stamped on the plates in the cylindrical shell by the thickness—expressed in inches or part of an inch—and divide by the radius or half diameter, also expressed in inches, and the result will be the pressure allowable per square inch of surface for single riveting, to which add 20 per cent where the longitudinal laps of the cylindrical parts of such boiler are double riveted, when all the rivet holes of such boiler, including steam and mud drums, have been fairly drilled and no part of such holes has been punched. The pressure allowed shall be based on the plate whose tensile strength multiplied by its thickness gives the lowest product.

GUIDE HOLES FOR DRILLS AND CUTTERS MAY BE PUNCHED.

Centers or guide holes not to exceed 75 per cent of the diameter of the full-sized finished hole for tubes and stays may be punched. The remainder shall be cleanly cut, drilled, or reamed to full size. Holes not to exceed 4 inches in diameter in plates five-eighths of an inch thick and under may be punched to within one-half inch of the full diameter of the finished hole; the remainder shall be cleanly cut, drilled, or reamed to full size. (Sec. 4433, R. S.)

HEADS.

REQUIREMENTS FOR HEADS.

3. All plates used as heads, when new and made to practically true circles, and as described below, shall be allowed a steam pressure in accordance with the following formula:

CONVEX HEADS.

$$P=\frac{T\times S}{R}$$

Where P = steam pressure allowable in pounds.
T = thickness of plate in inches.
S = one-fifth of the tensile strength.
R = one-half of the radius to which the head is bumped.

CONCAVE HEADS.

For concave heads the pressure allowable shall be eight-tenths times the pressure allowable for convex heads.

NOTE.—To find the radius of a sphere of which the bumped head forms a part, square the radius of head, divide this by the height of bump required; to the result add height of bump, which will equal diameter of sphere, one-half of which will be the required radius.

Example.

Required, the working pressure of a convex head of a 54-inch radius; material, 60,000 pounds tensile strength and one-half of an inch thick. Substituting values and solving, we have

$$P=\frac{0.5\times 12{,}000}{27}=222 \text{ pounds.}$$

The pressure allowable on a concave head of the same dimensions would be $222\times .8=177$ pounds.

To avoid grooving, the flanging shall be well rounded at the bend.

Bumped heads may contain a manhole opening flanged inwardly, when such flange is turned to a depth of three times the thickness of material in the head.

Material used in the construction of all bumped heads shall possess the physical and chemical qualities prescribed by the Board of Supervising Inspectors for all plates subject to tensile strain, as required by section 4430, Revised Statutes.

FLAT HEADS OF WROUGHT-IRON OR STEEL PLATE.

Where flat heads do not exceed 20 inches in diameter they may be used without being stayed, and the steam pressure allowable shall be determined by the following formula:

$$P=\frac{C\times T^2}{A}$$

Where P = steam pressure allowable in pounds.
T = thickness of material in sixteenths of an inch.
A = one-half the area of head in inches.
C = 112 for plates seven-sixteenths of an inch and under.
C = 120 for plates over seven-sixteenths of an inch.

Provided, The flanges are made to an inside radius of at least 1½ inches.

Example.

Required, the working pressure of a flat head 20 inches in diameter and three-fourths of an inch thick. Substituting values, we have

$$P=\frac{120\times 144}{157}=110 \text{ pounds.}$$

(Sec. 4418, R. S.)

MANHOLES, HANDHOLES, AND HOLES FOR PIPE CONNECTIONS.

4. All boilers built on and after August 1, 1914, shall have a manhole opening above the flues or tubes of not less than 10 by 16 inches, 11 by 15 inches, or of an equal area, in the clear, and shall have such other manhole openings in other parts of the boiler as may be required by local inspectors when considering blue prints or tracings submitted to them for approval, of sufficient dimensions to allow easy access to the interior of the boiler for the purpose of inspection and examination.

When holes exceeding 6 inches in diameter are cut in boilers for pipe connections, manhole and handhole plates, such holes shall be reinforced, either on the inside or outside of boiler, with reinforcing wrought-iron or steel rings, which shall be securely riveted or properly fastened to the boiler, such reinforcing material to be rings of sufficient width and thickness of material to fully compensate for the amount of material cut from such boilers, in flat surfaces; and where such opening is made in the circumferential plates of such boilers, the reinforcing ring shall have a sectional area equal to at least one-half of the sectional area of the opening parallel with the longitudinal seams of such portion of the boiler. On boilers carrying 75 pounds or less steam pressure a cast-iron stop valve, properly flanged, may be used as a reinforcement to such opening. When holes are cut in any flat surface of such boilers and such holes are flanged inwardly to a depth of not less than 1½ inches, measuring from the outer surface, the reinforcement rings may be dispensed with.

When reinforcing rings as described above are made of wrought iron or steel, the material shall not be required to be tested.

Seamless forged steel nozzles may be used for reinforcing holes cut in boilers when the amount of material in the flange of the saddle that is secured to the boiler is equal to the amount of material removed from the boiler.

No connection between shell of boiler and mud drum shall exceed 9 inches in diameter, and the flange of the mud-drum leg shall consist of an equal amount of material to that cut out of the shell of boiler. (Sec. 4418, R. S.)

DONKEY BOILERS.

5. Donkey boilers shall be inspected in the same manner as the main boilers. (Sec. 4418, R. S.)

DRILLING TO DETERMINE THICKNESS.

6. The shell of any boiler which has reached the age of 10 years shall, at the first annual inspection thereafter, and at such subsequent periods as the local or supervising inspectors may deem necessary, be drilled near the water line and at such other points in the shell as may be necessary to determine as nearly as possible the thickness of material, which ascertained thickness, together with the general condition of the boiler, shall govern the steam pressure allowed. (Secs. 4418, 4430, R. S.)

HYDROSTATIC PRESSURE.

7. The hydrostatic pressure applied shall be in the proportion of 150 pounds to the square inch to 100 pounds to the square inch of the steam pressure allowed, and the inspector, after applying the hydrostatic test, shall thoroughly examine every part of the boiler. The hydrostatic pressure shall also be applied to the main steam pipe up to the throttle.

In the application of the hydrostatic pressure to boilers, inspectors shall require such arrangements as will guard against main and auxiliary stop valves being subjected to hydrostatic pressure on one side at the same time that steam pressure is exerted on the opposite side.

Steamers on going out of service or laying up in winter quarters and beginning the annual inspection may have the hydrostatic pressure applied to boilers at any time preceding the date of the final completion of the inspection, so that, however, in no instance shall the vessel be navigated to exceed 12 months without the application of the hydrostatic pressure. (Sec. 4418, R. S.)

STEAM CHIMNEYS.

8. When steam chimneys constructed of flues subject to external pressure have a thickness of not less than seven-sixteenths of an inch, and the flue is heated only with the waste gases, and the temperature does not exceed 600° F., the working pressure shall be determined by the rules for plain furnaces or flues, corrugated furnaces, and Adamson type. When flues are strengthened with tee irons, angle irons, or bowling rings, the working pressure shall be determined by formula for plain furnace flues. When angle or tee bars are used, they shall have a thickness of leaf of at least two-thirds that of plate and a depth of at least one-fourth of pitch. Said tee bars shall be substantially riveted to flue. All rivet holes in tees shall be drilled, holes shall be staggered, distance from center of rivet holes to edge of tees shall be not less than 1.5 times diameter of rivet holes, and percentage of plate section shall be not less than rivet section. Bowling rings may be used, as they increase the strength and provide for expansion of flue. For all boilers carrying a steam pressure of over 60 pounds and not over 100 pounds per square inch the flue may be braced with socket bolts in lieu of tee rings. Such bolts shall have heads and the ends shall be threaded for nuts, with plate washers or equivalent on the inside of flue. Pitch of stays and bolts and the maximum stress in pounds allowable per square inch of cross-sectional area for stays and bolts shall be determined by section 16, Rule II.

If a greater working stress is desired on flues than that permitted by the formula for flues strengthened with bowling rings or tee irons, the flue may be braced to shell and may be deemed a flat surface, and shall be stayed in strict accordance with the rules for stays.

Drainpipes shall be fitted to steam chimneys in which water is liable to collect. Steam chimneys that are arranged to be disconnected from main boiler shall be provided with a safety valve not less than 3 inches in diameter and with a steam gauge, and shall be provided with manholes to enable inspectors to examine every portion of the interior. (Sec. 4418, R. S.)

RIVETED JOINTS.

9. The diameter of rivets, rivet holes, distance between centers of rivets, and distance from centers of rivets to edge of lap for different thicknesses of plates for single and double riveting shall be determined by the following rules.

The following formulas, equivalent to those of the British Board of Trade, are given for the determination of the pitch, distance between rows of rivets, diagonal pitch, maximum pitch, and distance from centers of rivets to edge of lap of single and double riveted lap joints for both iron and steel boilers:

Let p = greatest pitch of rivets in inches.
n = number of rivets in one pitch.
p_d = diagonal pitch in inches.
d = diameter of rivets in inches.
T = thickness of plate in inches.
V = distance between rows of rivets in inches.
E = distance from edge of plate to center of rivet in inches.

TO DETERMINE THE PITCH.

Iron plates and iron rivets:

$$p = \frac{d^2 \times 0.7854 \times n}{T} + d.$$

Example, first, for single-riveted joint: Given, thickness of plate $(T) = \frac{1}{2}$ inch, diameter of rivet $(d) = \frac{7}{8}$ inch. In this case $n = 1$. Required the pitch.

Substituting in formula, and performing operation indicated,

$$\text{Pitch} = \frac{(\frac{7}{8})^2 \times 0.7854 \times 1}{\frac{1}{2}} + \frac{7}{8} = 2.077 \text{ inches.}$$

Example for double-riveted joint: Given, $t = \frac{1}{2}$ inch and $d = \frac{13}{16}$ inch. In this case $n = 2$. Then—

$$\text{Pitch} = \frac{(\frac{13}{16})^2 \times 0.7854 \times 2}{\frac{1}{2}} + \frac{13}{16} = 2.886 \text{ inches.}$$

For *steel* plates and steel rivets:

$$p = \frac{23 \times d^2 \times 0.7854 \times n}{28 \times T} + d.$$

Example for single-riveted joint: Given, thickness of plate $= \frac{1}{2}$ inch diameter of rivet $= \frac{15}{16}$ inch. In this case $n = 1$.

$$\text{Pitch} = \frac{23 \times (\frac{15}{16})^2 \times 0.7854 \times 1}{28 \times \frac{1}{2}} + \frac{15}{16} = 2.071 \text{ inches.}$$

Example for double-riveted joint: Given, thickness of plate $= \frac{1}{2}$ inch diameter of rivet $= \frac{7}{8}$ inch. $n = 2$. Then—

$$\text{Pitch} = \frac{23 \times (\frac{7}{8})^2 \times 0.7854 \times 2}{28 \times \frac{1}{2}} + \frac{7}{8} = 2.85 \text{ inches.}$$

FOR DISTANCE FROM CENTER OF RIVET TO EDGE OF LAP.

$$E = \frac{3 \times d}{2}.$$

Example: Given, diameter of rivet $(d)=\frac{7}{8}$ inch; required the distance from center of rivet to edge of plate.

$$E=\frac{3\times\frac{7}{8}}{2}=1.312 \text{ inches, for single or double riveted lap joint.}$$

FOR DISTANCE BETWEEN ROWS OF RIVETS.

The distance between lines of centers of rows of rivets for double, chain-riveted joints (V) shall not be less than twice the diameter of rivet, but it is more desirable that V should not be less than $\frac{4d+1}{2}$.

Example under latter formula: Given, diameter of rivet $=\frac{7}{8}$ inch. Then—

$$V=\frac{(4\times\frac{7}{8})+1}{2}=2.25 \text{ inches.}$$

For ordinary, double, zigzag riveted joints:

$$V=\frac{\sqrt{(11p+4d)\quad(p+4d)}}{10}.$$

Example: Given, pitch $=2.85$ inches, and diameter of rivet $=\frac{7}{8}$ inch. Then—

$$V=\frac{\sqrt{(11\times 2.85+4\times\frac{7}{8})\quad(2.85+4\times\frac{7}{8})}}{10}=1.487 \text{ inches.}$$

DIAGONAL PITCH.

For double, zigzag riveted lap joint. Iron and steel:

$$p_d=\frac{6p+4d}{10}$$

Example: Given, pitch $=2.85$ inches, and $d=\frac{7}{8}$ inch. Then—

$$p_d=\frac{(6\times 2.85)+(4\times\frac{7}{8})}{10}=2.06 \text{ inches.}$$

MAXIMUM PITCHES FOR RIVETED LAP JOINTS.

For single-riveted lap joints:

$$\text{Maximum pitch}=(1.31\times T)+1\tfrac{5}{8}.$$

For double-riveted lap joints:

$$\text{Maximum pitch}=(2.62\times T)+1\tfrac{5}{8}.$$

Example: Given, a thickness of plate $=\frac{1}{2}$ inch, required the maximum pitch allowable.

For single-riveted lap joint:

$$\text{Maximum pitch} = (1.31 \times \tfrac{1}{2}) + 1\tfrac{5}{8} = 2.28 \text{ inches.}$$

For double-riveted lap joint:

$$\text{Maximum pitch} = (2.62 \times \tfrac{1}{2}) + 1\tfrac{5}{8} = 2.935 \text{ inches.}$$

To determine the pitch of rivets from the above formulas, use the diameter and area of the rivet holes. The diameter of the rivets is the diameter of the driven rivet.

Any riveted joint shall be allowed when it is constructed so as to give an equal percentage of strength to that obtained by the use of the formula given. (Secs. 4418, 4433, R. S.)

BUTT STRAPS.

10. Where butt straps are used in the construction of marine boilers, the straps for single butt strapping shall in no case be less than the thickness of the shell plates; and where double butt straps are used, the thickness of each shall in no case be less than five-eighths the thickness of the shell plates. (Sec. 4418, R. S.)

WOODWORK FROM BOILERS.

11. *Externally heated boilers* shall have a clear space between the boiler and the woodwork of not less than 6 inches at the sides and 4 inches at the top.

Internally heated boilers shall have a clear space between the boiler and the woodwork of not less than 4 inches at the sides and 4 inches at the top.

All woodwork or other ignitible substance approaching within 12 inches of the boiler or smokestack (unless such boiler or smokestack is covered with good nonconducting material) shall be suitably sheathed with metal over noncombustible material, and it shall be the duty of the inspectors to see that all woodwork or other ignitible substance in or around the fireroom is properly protected by metal or asbestos sheathing.

All boilers hereafter placed in wooden steamers shall have a clear space of at least 8 inches between the underside of the cylindrical shell and the floor or keelson; and on all other steamers the boilers shall be so placed as to permit of proper inspection of the underside thereof.

All water-tube or coil boilers shall have a clear space of not less than 4 inches between the back end of boiler and bulkhead. All other boilers shall have a clear space of not less than 2 feet between the back end of boiler and bulkhead. (Secs. 4418, 4470, R. S.)

ANGLE STIFFENERS FOR CURVED SURFACES.

12. Where rounded bottoms of combustion chambers are stiffened with single angle-iron stiffeners, such angles shall have a thickness of leaf eight-tenths that of the plate and a depth of at least one-half pitch. Where stiffened with double angle irons or tee bars, such

angles or tee bars shall have a thickness of leaf at least two-thirds that of plate and a depth of at least one-fourth of pitch. Said angles or tee bars shall be substantially riveted to the plate supported. Where the bottoms of combustion chambers are strengthened by angles or tee irons, the same shall be on the water side of the combustion chambers, as shown in the sketches on pages 15–19.

Where rounded tops of combustion chambers are stiffened with single or double angle-iron stiffeners or tee bars, such angles or tee bars shall be of thickness and depth of leaf not less than specified for rounded bottoms of combustion chambers. Said angles or tee bars shall be supported on thimbles and riveted through with rivets not less than 1 inch in diameter and spaced not to exceed 6 inches between centers.

Working pressure allowed on rounded surfaces supported by angle irons or tee bars shall be determined by the following formula:

$$\text{Working pressure} = \frac{900 \times T^2}{P \times D}$$

Where T = thickness of plate in sixteenths of an inch.
P = pitch of angle or tee stiffeners, in inches.
D = diameter of curve to which plate is bent, in inches.

Example.

Given $T = \frac{9}{16}$ of an inch. P = 7 inches. D = 51 inches.
Substituting values in formula and solving,

$$\text{Working pressure} = \frac{900 \times 81}{7 \times 51} = 204 \text{ pounds per square inch.}$$

PRESSURE PERMISSIBLE ON ROUNDED BOTTOM OF COMBUSTION CHAMBERS, ANGLES BEING OMITTED, AND TUBE SHEETS.

$$P = \frac{50\ (300T - 2L)}{D}$$

Where P = working pressure in pounds.
T = thickness of bottom plate of combustion chamber, in inches.
L = extreme length of plate forming bottom of combustion chamber, in inches.
D = twice outside radius of bottom of combustion chamber, in inches.

Required working pressure on bottom plate of a combustion chamber, angles being omitted: Thickness of plate, 0.82 of an inch; extreme length of plate, 33 inches; twice the radius of bottom of combustion chamber, 50 inches. Substituting and solving:

$$P = \frac{50 \times (300 \times 0.82 - 2 \times 33)}{50} = 180 \text{ pounds.}$$

$$T = \frac{P \times D + 100L}{15{,}000}$$

Pressure allowable on tube sheets where combustion chambers are not suspended from the shell of the boiler shall be determined by the following formula:

$$P=\frac{(D-d)\ T\times 27{,}000}{W\times D}$$

Where P = working pressure in pounds.
D = least horizontal distance between tube centers in inches.
d = inside diameter of tubes in inches.
T = thickness of tube plate in inches.
W = extreme width of combustion chamber in inches.

Required the working pressure of a tube sheet supporting a crown sheet braced by crown bars. Horizontal distance between centers, 4⅛ inches; inside diameter of tubes, 2.782 inches; thickness of tube sheets, eleven-sixteenths of an inch; extreme width of combustion chamber, 34¼ inches, measured from outside of tube plate to outside of back plate; material, steel. Substituting and solving

$$P=\frac{(4.125-2.782)\times 0.6875\times 27{,}000}{34.25\times 4.125}=176 \text{ pounds pressure.}$$

The compressive stress on tube plates, as determined by the following formula, shall not exceed 13,500 pounds per square inch when pressure on top of combustion chamber is supported by vertical plates of such chamber.

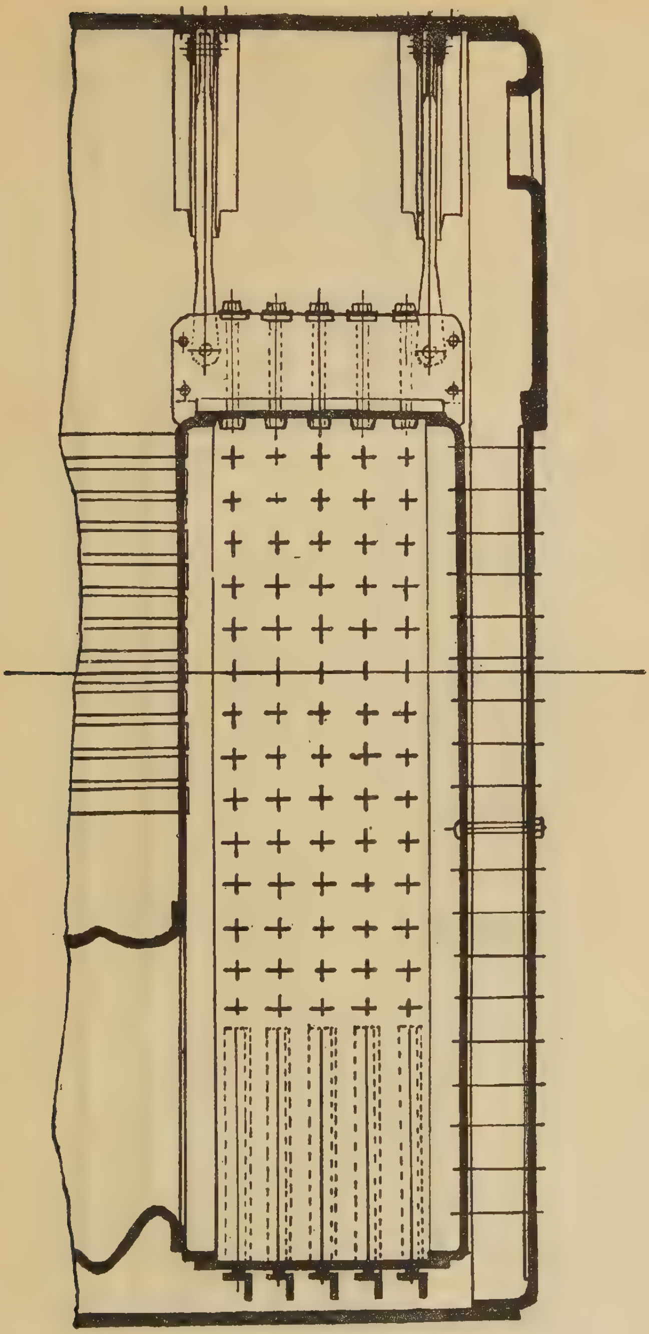
$$C=\frac{P\times D\times W}{2\ (D-d)\ T}$$

Where C = stress on tube sheet.
P = working pressure in pounds.
D = least horizontal distance between tube centers in inches.
d = inside diameter of tube in inches.
W = extreme width of combustion chamber in inches.
T = thickness of tube sheet in inches.

Sling stays may be used in lieu of girders in all cases; provided, however, that when such sling stays are used, girders or screw stays of the same sectional area shall be used for securing the bottom of combustion chamber to the boiler shell.

When girders are dispensed with and the top and bottom of combustion chambers are secured by sling stays or braces, the sectional area of such stays shall conform with the requirements of section 16, Rule II.

The following drawings show an excellent practice of constructing combustion chambers with and without sling stays:

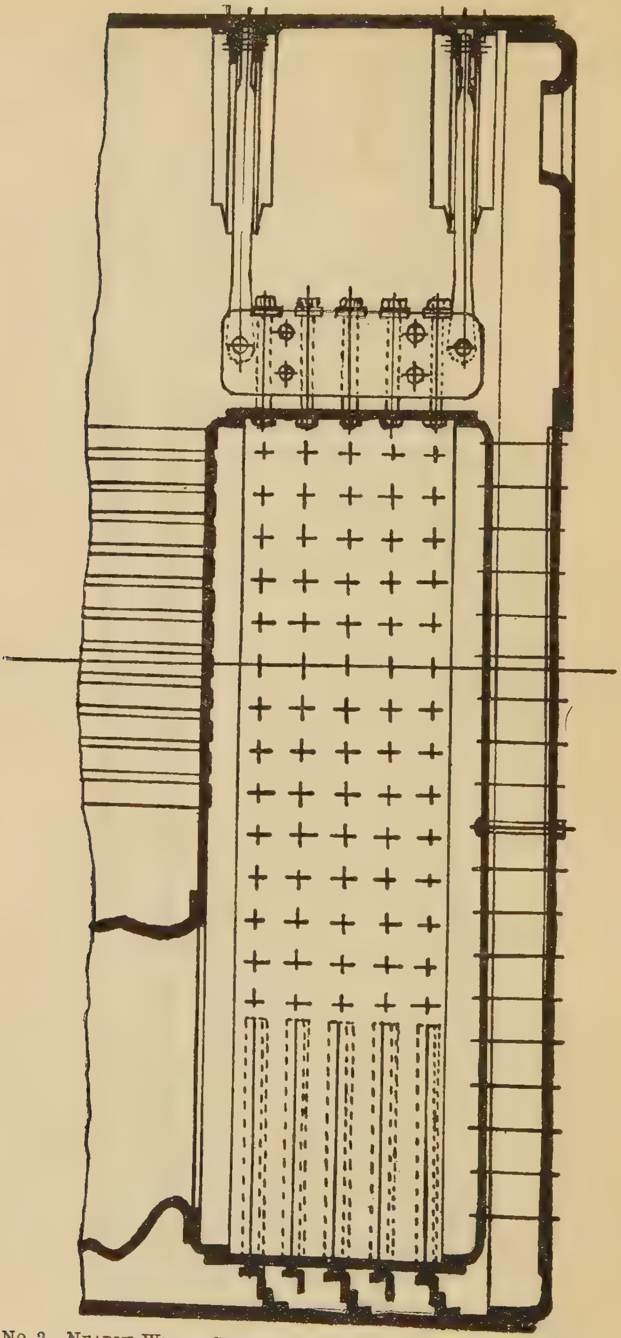


No. 1.—FULL LOAD ON TUBE SHEET AND BACK PLATE.

Diameter of hangers should be sufficient to carry the weight of combustion chamber and one-half the tubes and furnaces when no water is in boiler. No effect of buoyancy is considered.

These remarks are for separate combustion chambers when they are not secured to the shell at the bottom and therefore liable to bend the small screw stays.

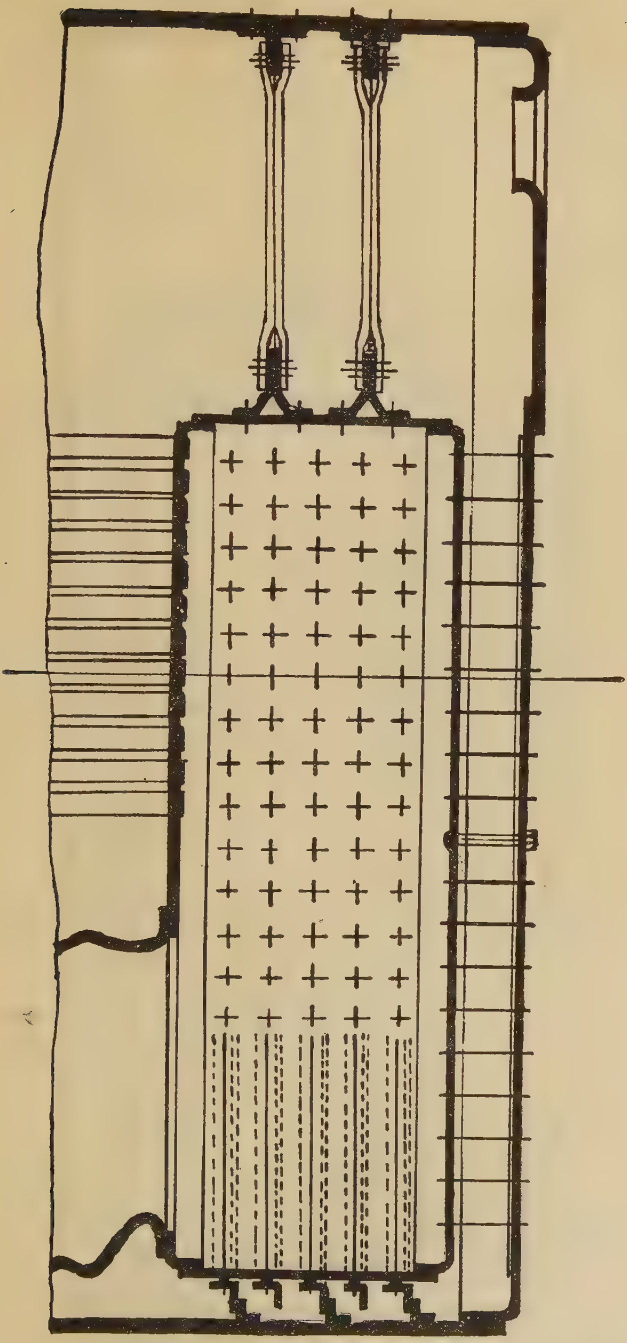
In this case the tube sheet and back plate get the full compressive load in a similar manner to a boiler without hanging stays.



No. 2.—Nearly Whole Compressive Load Taken off Tube Sheet.

Top hanging stays take full compressive load off tube sheet and back plate, except that half the load on unsupported portions marked B beyond stays will be taken by the tube sheet and back plate, respectively, and the other half by the last stays.

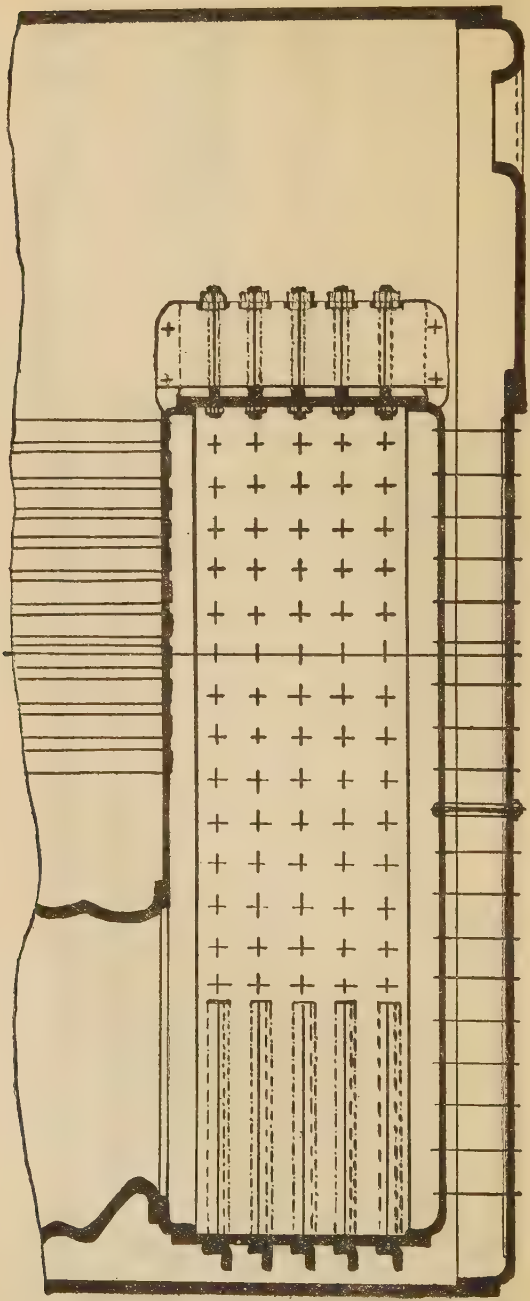
The thickness of tube sheet and back plate may be materially reduced from what would be required when tube sheet and back plate take full compressive load, providing that combustion chamber is well stayed to take full load at the bottom by screw stays or girders of plates and angles.



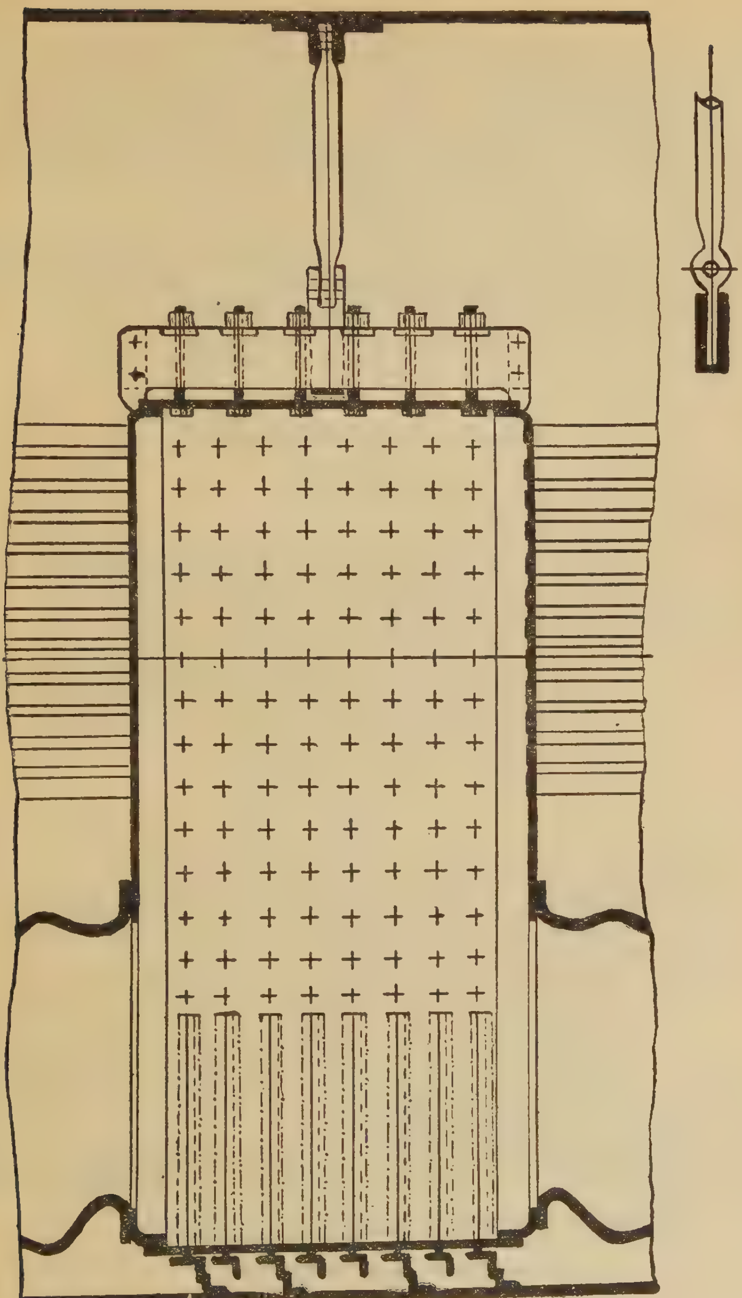
No. 3.—Nearly Whole Compressive Load Taken off Tube Sheet.

Top hanging stays take full compressive load off tube sheet and back plate, except that half the load on unsupported portions marked B beyond stays will be taken by the tube sheet and back plate, respectively, and the other half by the last stays.

The bottom stays, whether of screw stays or girders of plates and angles, shall be of the same sectional area as the top braces, and no boiler should be built having top stays as shown without having the bottom stays of equal strength.



No. 4.—Tube Sheet and Back Plate Get Full Load, and Therefore Should be Heavy Enough to Withstand Such.



No. 5.—Tube Sheets Each Take Part of Compressive Load, the Hanging Stays Taking Care of the Other Part.

The bottom stays, whether of screw stays or girders of plates and angles, shall be of the same sectional area as the top braces.

In this case the thickness of the tube sheets may be materially reduced from what would be required when tube sheets together take full compressive load. (Sec. 4418, R. S.)

FURNACES.

13. The tensile strength of steel used in the construction of corrugated or ribbed furnaces shall not exceed 67,000 and be not less than 54,000 pounds; and in all other furnaces the minimum tensile strength shall be not less than 58,000 and the maximum not more than 67,000 pounds. The minimum elongation in 8 inches shall be 20 per cent.

All corrugated furnaces having plain parts at the ends not exceeding 9 inches in length (except flues especially provided for), when new, and made to practically true circles, shall be allowed a steam pressure in accordance with the following formula:

$$P=\frac{C\times T}{D}.$$

LEEDS SUSPENSION BULB FURNACE.

$$P=\frac{C\times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths of an inch.
D = mean diameter in inches.
C = 17,300, a constant, determined from an actual destructive test under the supervision of the board, when corrugations are not more than 8 inches from center to center and not less than 2¼ inches deep.

MORISON CORRUGATED TYPE.

$$P=\frac{C\times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths of an inch.
D = mean diameter in inches.
C = 15,600, a constant, determined from an actual destructive test under the supervision of the Board of Supervising Inspectors, when corrugations are not more than 8 inches from center to center and the radius of the outer corrugations is not more than one-half of the suspension curve.

[In calculating the mean diameter of the Morison furnace, the least inside diameter plus 2 inches may be taken as the mean diameter, thus—

Mean diameter = least inside diameter + 2 inches.]

DEIGHTON CORRUGATED TYPE.

$$P=\frac{C\times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths of an inch.

Where D = mean diameter in inches.
C = 15,600, a constant, when corrugations are not more than 8 inches from center to center and not less than 1½ inches deep.

FOX TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths.
D = mean diameter in inches.
C = 14,000, a constant, when corrugations are not more than 8 inches from center to center and not less than 1½ inches deep.

PURVES TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than seven-sixteenths.
D = least outside diameter in inches.
C = 14,000, a constant, when rib projections are not more than 9 inches from center to center and not less than 1⅜ inches deep.

BROWN TYPE.

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than five-sixteenths.
D = least outside diameter in inches.
C = 14,000, a constant (ascertained by an actual destructive test under the supervision of this board), when corrugations are not more than 9 inches from center to center and not less than 1⅝ inches deep.

PLUG FOR CORRUGATED AND RIBBED FURNACES.

The thickness of corrugated and ribbed furnaces shall be ascertained by actual measurement. The manufacturer shall have said furnaces drilled for a ⅜-inch pipe tap and fitted with a screw plug that can be removed by the inspector when taking this measurement. For the Brown and Purves furnaces the holes shall be in the center of the second flat; for the Morison, Fox, and other similar types, in the center of the top corrugation, at least as far in as the fourth corrugation from the end of the furnace.

TYPE HAVING SECTIONS 18 INCHES LONG

$$P = \frac{C \times T}{D}$$

Where P = pressure in pounds.
T = thickness in inches, not less than seven-sixteenths.

Where D = mean diameter in inches.
C = 10,000, a constant, when corrugated by sections not more than 18 inches from center to center and not less than $2\frac{1}{2}$ inches deep, measuring from the least inside to the greatest outside diameter of the corrugations and having the ends fitted one into the other and substantially riveted together, provided that the plain parts at the ends do not exceed 12 inches in length.

ADAMSON TYPE.

When plain horizontal flues are made in sections not less than 18 inches in length, and not less than five-sixteenths of an inch thick, and flanged to a depth of not less than three times the diameter of rivet holes plus the radius at furnace wall (inside diameter of furnace), the thickness of the flanges shall be as near the thickness of the body of the plate as practicable.

The radii of the flanges on the fire side shall be not less than three times the thickness of plate.

The distance from the edge of the rivet hole to the edge of the flange shall be not less than the diameter of the rivet hole, and the diameter of the rivets before driven shall be at least one-fourth inch larger than the thickness of the plate.

The depth of the ring between the flanges shall be not less than three times the diameter of the rivet holes, and the ring shall be substantially riveted to the flanges. The fire edge of the ring shall terminate at or about the point of tangency to the curve of the flange, and the thickness of the ring shall be not less than one-half inch.

The pressure allowed shall be determined by the following formula:

ADAMSON FURNACES IN SECTIONS OF NOT LESS THAN 18 INCHES IN LENGTH.

$$P = \frac{57.6}{D}\left[(18.75 \times T) - (1.03 \times L)\right]$$

Where P = working pressure in pounds per square inch.
D = outside diameter of furnace in inches.
L = length of section in inches.
T = thickness of plate in sixteenths of an inch.

Example.

Given a furnace 44 inches in diameter, 48 inches in length, and one-half of an inch thick. Substituting values in formula, we have

$$P = \frac{57.6}{44}\left[(18.75 \times 8) - (1.03 \times 48)\right] =$$

$$1.309\ (150 - 49.44) = 131 \text{ pounds.}$$

SPHERICAL-TOP FURNACES.

Thickness and working pressure of furnaces of 20 inches in diameter and over, when tops are portions of spheres and made in one plate, shall be determined by the following formula:

$$T = \frac{P \times R}{10{,}000} + 0.12.$$

Where P = working pressure in pounds.
T = thickness of plate in inches when constructed of one plate.
R = radius of curvature in inches.
% = efficiency per cent of riveted joint when end of furnace is constructed of more than one plate, the thickness will be % T.

Example.

Required the thickness of a spherical convex furnace made in one sheet. Working pressure, 125 pounds per square inch; radius of curvature, 34 inches. Substituting values,

$$T = \frac{125 \times 34}{10{,}000} + 0.12 = 0.545.$$

If the end of the furnace is constructed of more than one plate and efficiency per cent of riveted joint is 75,

$$T = \frac{0.545}{0.75} = 0.72 \text{ of an inch.}$$

Solving for P, we have

$$P = \frac{(T - 0.12) \times 10{,}000}{R}.$$

Required the working pressure when end of furnace is constructed of a single plate. Thickness, 0.545 of an inch; radius of curvature, 34 inches. Substituting values and solving,

$$P = \frac{(0.545 - 0.12) \times 10{,}000}{34} = 125 \text{ pounds.}$$

PLAIN CIRCULAR RIVETED FLUES, FURNACES, AND CONE TOPS MADE IN SECTIONS OF NOT LESS THAN 18 INCHES IN LENGTH AND NOT LESS THAN FIVE-SIXTEENTHS OF AN INCH THICK.

Cylindrical riveted flues and furnaces made in sections of not less than 18 inches in length fitted one into the other and substantially riveted, combustion chambers for vertical submerged tubular boilers in the shape of a frustum of a cone, constructed to a practically true circle, shall be allowed a steam pressure according to the following formula:

$$P = \frac{51.5}{D}\left[(18.75 \times T) - (1.03 \times L)\right]$$

Where P = working pressure in pounds per square inch.
D = outside diameter of furnaces in inches, or outside *mean* diameter of cone top in inches.
L = length of section or flue in inches.
T = thickness of furnace or cone top in sixteenths of an inch, not to be less than five-sixteenths of an inch.

When diameter of plain furnaces and flues used in vertical type of boilers or mean diameter of cone tops exceeds 42 inches, they shall be deemed a flat surface and must be stayed in accordance with rules governing flat surfaces. If a greater working pressure than given by formula is desired for mean diameters under 42 inches, the flues or cone tops shall be substantially stayed for such additional pressure.

Example.

Given a furnace 26 inches in diameter, 28 inches in height, and five-sixteenths of an inch thick. A steam pressure of 175 pounds is desired.

Substituting values in formula,

$$P=\frac{51.5}{26}\left[(18.75\times 5)-(1.03\times 28)\right]=128 \text{ pounds.}$$

$175-128.5$, an excess of 46.5 pounds, therefore furnace shall be braced.

Substituting 46.5 for working pressure, W. P. in formula.

Working pressure, W. P. $=\frac{C\times T^2}{P^2}$.

Solving for P^2,

$$P^2=\frac{112\times 5^2}{46.5},$$

$$P=\sqrt{60.21}=7.7.$$

Pitch of $7.7\times 7.7=59.29$ area.

To determine size of stay bolt. Area multiplied by pressure per square inch equals total stress on stay. Thus, $59.29\times 46.5=2{,}756.985$ pounds pressure on the plate. Thus, 2,756.985 divided by 6,000 = 0.4594 area of stay bolt, practically a thirteen-sixteenths of an inch stay bolt taken at root of thread. (Sec. 4418, R. S.)

FLUES.

PLAIN, LAPWELDED STEEL FLUES, 7 TO 18 INCHES DIAMETER.

14. Working pressures and corresponding minimum thicknesses of wall for long, plain, lapwelded, and seamless steel flues, 7 to 18 inches diameter, subjected to external pressure only, shall be determined by the following table and formula:

Outside diameter of flue.	Working pressure in pounds per square inch.						
	100	120	140	160	180	200	220
	Thickness of flue in inches. Safety factor, 5.						
Inches.							
7	0.152	0.160	0.168	0.177	0.185	0.193	0.201
8	.174	.183	.193	.202	.211	.220	.229
9	.196	.206	.217	.227	.237	.248	.258
10	.218	.229	.241	.252	.264	.275	.287
11	.239	.252	.265	.277	.290	.303	.316
12	.261	.275	.289	.303	.317	.330	.344
13	.283	.298	.313	.328	.343	.358	.373
14	.301	.320	.337	.353	.369	.385	.402
15	.323	.343	.361	.378	.396	.413	.430
16	.344	.366	.385	.404	.422	.440	.459
17	.366	.389	.409	.429	.448	.468	.488
18	.387	.412	.433	.454	.475	.496	.516

Thicknesses in this table were calculated by formula:

$$T = \frac{[(F \times P) + 1{,}386]D}{86{,}670}$$

Where D = outside diameter of flue in inches.
T = thickness of wall in inches.
P = working pressure in pounds per square inch.
F = factor of safety.

This formula is applicable to lengths greater than six diameters of flue, to working pressures greater than 100 pounds, to outside diameters of from 7 to 18 inches, and to temperatures less than 650° F.

Example.

Required the thickness of a flue 10 inches in diameter; working pressure, in pounds per square inch, 200; factor of safety, 5. Substituting and solving:

$$T = \frac{[(5 \times 200) + 1{,}386]10}{86{,}670} = 0.275 \text{ of an inch.}$$

To determine working pressure, diameter and thickness being given:

$$P = \frac{(T \times 86{,}670) - (1{,}386 \times D)}{D \times F}$$

Where D = outside diameter of flue in inches.
T = thickness of wall in inches.
P = working pressure in pounds per square inch.
F = factor of safety.

Example.

Required the working pressure of a flue 12 inches outside diameter, 0.375 of an inch thick; factor of safety is 5.
Substituting and solving:

$$P = \frac{(0.375 \times 86{,}670) - (1{,}386 \times 12)}{12 \times 5} = 264.4 \text{ pounds pressure.}$$

WORKING PRESSURE ALLOWABLE ON RIVETED FLUES OVER 6 AND NOT OVER 18 INCHES IN DIAMETER, MADE IN SECTIONS, AND SUBJECTED TO EXTERNAL PRESSURE ONLY.

When flues are constructed of plates made in sections and efficiently riveted together, not less than 24 inches in length, minimum thickness, 0.25 of an inch, over 6 and not exceeding 18 inches in diameter, the working pressure shall be determined by the following formula:

$$P = \frac{8{,}100 \times T}{D}$$

Where P = working pressure in pounds per square inch.
T = thickness in inches.
D = outside diameter in inches.

Example.

Required the working pressure of a flue 13 inches outside diameter, 0.33 of an inch thick.

Substituting values and solving:

$$P=\frac{8{,}100\times0.33}{13}=205 \text{ pounds.}$$

WORKING PRESSURE ALLOWABLE ON RIVETED, SEAMLESS, OR LAPWELDED FLUES OVER 18 AND NOT OVER 28 INCHES IN DIAMETER, MADE IN SECTIONS, AND SUBJECTED TO EXTERNAL PRESSURE ONLY.

The working pressure allowable on riveted, seamless, or lapwelded flues over 18 inches in diameter up to and including 28 inches in diameter, made in sections not less than 24 inches in length, efficiently riveted together, sections not to exceed 3½ times the diameter of the flue, when subjected to external pressure only, shall be determined by the following formula:

$$P=\frac{51.5}{D}[(18.75\times T)-(L\times1.03)]$$

Where P = working pressure in pounds per square inch.
D = outside diameter of flue in inches.
L = length of flue in inches, not to exceed 3½ diameters of flue.
T = thickness of wall in sixteenths of an inch.

Example.

Required the working pressure of a flue 19 inches outside diameter, 0.4375 of an inch thick, length 66 inches.

Substituting values and solving:

$$P=\frac{51.5}{19}[(18.75\times7)-(66\times1.03)]=171 \text{ pounds pressure.}$$

When lapwelded or seamless flues over 5 inches in diameter are used in externally fired boilers over 20 feet in length, they may be allowed to be made in two pieces: (1) joined together by a standard screw-pipe coupling or sleeve; (2) by swelling the end of one section of the flue sufficiently to permit it to lap over the other section not less than 4 inches and be double riveted; or (3) by butting the two sections of the flue together and fitting a band or butt strap not less than 8 inches in length equally divided over the joint of the two sections, and of a thickness not less than the thickness of the flue, and double riveted to each section. When any of the above methods are used on more than one flue in a boiler, the couplings or sleeves shall not be allowed to come opposite, and the distance measured between any such flues and between any such flues and the shell shall be made by measuring between the plates in the flues and the plates in the shell. It shall be the duty of the inspectors to see that the flues are well screwed into the couplings or sleeves so as to have the ends of flues as near together as is practicable.

Inspectors are required at each annual inspection to carefully inspect the flues of every boiler and subject them to the hammer test where possible or practicable in order that deterioration of material may be detected. If such test indicates thin material, the doubtful place shall be drilled and the material carefully gauged in order that the safe pressure may be determined; or if the flue is found to deviate from the form of a practically true circle, the pressure shall be reduced accordingly. The efficiency and workmanship of the riveted seams shall also be carefully observed at all inspections. (Sec. 4418, R. S.)

TUBES.

15. Lapwelded and seamless tubes, used in boilers whose construction was commenced after June 30, 1910, having a thickness of material according to their respective diameters, shall be allowed a working pressure as prescribed in the following table, provided they are deemed safe by the inspectors. Where heavier material is used, pressure may be allowed as prescribed in first formula under the heading "Flues," for determining the working pressure of lapwelded flues. Any length of tube is allowable.

Outside diameter.	Thickness of material.	Maximum pressure allowed.
Inches.	*Inch.*	*Pounds.*
2	0.095	427
2¼	.095	380
2½	.109	392
2¾	.109	356
3	.109	327
3¼	.120	332
3½	.120	308
3¾	.120	282
4	.134	303
4½	.134	238
5	.148	235
6	.165	199

LAPWELDED BOILER TUBES UP TO AND INCLUDING 4 INCHES IN DIAMETER.

All lapwelded tubes shall be made of charcoal iron, or mild steel, made by any process.

American ingot iron, manufactured by the American Rolling Mill Co., Middletown, Ohio, shall be accepted as meeting the provisions for lapwelded tubes.

SURFACE INSPECTION.

Tubes shall be free from defective welds, cracks, blisters, scale, pits, and sand marks.

TESTS.

The following tests shall be made before shipment by the manufacturer:

(*a*) A test piece 2 inches in length cut from a tube shall stand being flattened by hammering until the sides are brought parallel and separated by a distance not greater than one-third the outside diameter of the tube, without showing cracks or flaws, the weld being 45° from the bend.

(*b*) A second tube shall have a flange turned over at right angles to the body of the tube and shall have a width equal to three-eighths of an inch. Tubes less than 3 inches in diameter shall only be required to have a flange turned equal to one-eighth of the diameter of the tube. This test shall not be applied to threaded stay tubes.

All the work shall be done cold.

Each tube shall stand an internal hydrostatic pressure of 1,000 pounds per square inch and shall be struck near both ends while under pressure with a 2-pound hammer or its equivalent without showing signs of weakness or defects.

All steel tubes, except those made of open-hearth steel, shall have the ends properly annealed by the manufacturer before shipment.

All tubes shall stand expanding, flanging over on the tube plate, and beading without flaws, cracks, or opening at the weld, except threaded stay tubes.

LAPWELDED BOILER TUBES OVER 4 INCHES UP TO AND INCLUDING 30 INCHES IN DIAMETER.

All lapwelded boiler tubes over 4 inches in diameter, up to and including 30 inches in diameter, shall be made of wrought iron or mild steel, made by any process.

American ingot iron, manufactured by the American Rolling Mill Co., Middletown, Ohio, shall be accepted as meeting the provisions for lapwelded tubes.

(*a*) A test piece, 2 inches in length, cut from a tube, shall stand being flattened by hammering until the sides are brought parallel and separated by a distance not greater than one-third the outside diameter of the tube, without showing cracks or flaws, with the weld being 45° from the bend.

Each tube shall stand an internal hydrostatic pressure of 500 pounds per square inch and shall be struck near both ends while under pressure with a 2-pound hammer or its equivalent without showing signs of weakness or defects.

All steel tubes except those made of open-hearth steel shall have ends properly annealed by the manufacturer before shipment.

All tubes shall stand drilling, riveting, and calking, and work necessary to install them into the tube head without showing any weakness or defects.

SEAMLESS STEEL BOILER TUBES.

MATERIAL.

The steel shall be made by the open-hearth process.

SURFACE INSPECTION.

Tubes shall be free from all surface defects. The defects to be particularly avoided in seamless tubes are tears, snakes, checks, slivers, scratches, laps, pits, rings, and sinks.

All seamless steel cold-drawn tubes shall be annealed as a final process. One or more tubes shall be selected at random from each charge of annealing furnace, and coupons cut from same for testing.

(*a*) A piece 3 inches long cut from the first tube shall stand being flattened by hammering until the sides are brought parallel and separated by a distance not greater than one-third the outside diameter of the tube, without showing cracks or flaws.

(*b*) A flange shall be turned all around the end of the tube to a width equal to three-eighths of an inch beyond the outside body of the tube. Tubes less than 3 inches in diameter shall only be required to have a flange turned equal to one-eighth of the diameter of the tube. This test shall not be applied to threaded stay tubes.

Tests (*a*) and (*b*) shall be done cold.

Where hot-finished tubes are furnished, the tubes shall pass the same manipulating tests as cold-drawn tubes and shall be subject to the same conditions as to gauge, but do not have to be annealed.

Each tube shall be subjected to an internal hydrostatic pressure of 1,000 pounds per square inch without showing signs of weakness or defects.

All tubes, except threaded stay tubes, shall stand expanding, flanging over on the tube plate, and beading without flaw or crack.

All tubes shall be carefully gauged and shall not be less than the specified thickness.

No tube increased in thickness by welding one tube inside of another shall be allowed for use, but the ends of boiler tubes may be welded on for the purpose of making repairs, or new tubes may be welded for the purpose of making them longer: *Provided*, That such welding is not made by any process of autogenous welding.

STATEMENT OR CERTIFICATE OF MANUFACTURER OF BOILER TUBES.

When the manufacturers of boiler tubes file with the Supervising Inspector General a certificate duly sworn to that all tubes manufactured by them will stand the tests and meet all the requirements of the foregoing rule, they shall be accepted by inspectors of this Service and no other affidavit will be required. (Secs. 4405, 4418, R. S.)

STAYS.

16. The maximum working pressure in pounds allowable per square inch of cross-sectional area for stays used in the construction of marine boilers where same are accurately fitted normal to supported surfaces and properly secured shall be ascertained by the following formula:

$$P=\frac{A\times C}{a}$$

Where P = working pressure in pounds.
A = least cross-sectional area of stay in inches.
a = area of surface supported by one stay in inches.
C = a constant.
C = 9,000 for tested steel stays 1 inch and upward in diameter when such stays are not forged or welded. The ends may be upset to a sufficient diameter to allow for the depth of the thread. The diameter shall be taken at the bottom of the thread, provided it is the least diameter of the stay. All such stays after being upset shall be thoroughly annealed.

Where $C=8{,}000$ for a tested Huston or similar type of brace, the cross-sectional area of which exceeds 5 square inches.
$C=7{,}000$ for such tested braces when the cross-sectional area is not less than 1.227 and not more than 5 square inches, provided such braces are prepared at one heat from a solid piece of plate without welds.
$C=7{,}500$ for wrought-iron stays 1 inch and upward in diameter when made of the best quality of refined iron. The ends may be upset to allow for the depth of the thread. The diameter shall be taken at the bottom of the thread, provided it is the least diameter of the stay. Such stays may be welded.
$C=6{,}000$ for welded crowfoot stays when made of best quality of refined wrought iron, and for all stays not otherwise provided for when made of the best quality of refined iron or of steel without welds.

Example.

Required the working pressure of a stay 1 inch in diameter, pitched 6 by 6 inches center to center.

$$\text{Working pressure}=\frac{(1\times1\times0.7854)\times6{,}000}{6\times6}=130.9 \text{ pounds.}$$

Stay bolts and stays made of the best quality of refined wrought iron may be welded. The lengthening of steel stays by welding shall not be allowed.

TO DETERMINE THE AREAS OF DIAGONAL AND GUSSET STAYS.

Multiply the area of a direct stay required to support the surface by the slant or diagonal length of the stay; divide this product by the length of a line drawn at right angles to surface supported to center of palm of diagonal stay. The quotient shall be the required area of the diagonal stay.

$$A=\frac{a\times L}{l}$$

Where A = sectional area of diagonal stay.
a = sectional area of direct stay.
L = length of diagonal stay.
l = length of line drawn at right angles to boiler head or surface supported to center of palm of diagonal stay.

Given diameter of direct stay = 1 inch, $a=0.7854$, $L=60$ inches, $l=48$ inches, substituting and solving,

$$A=\frac{0.7854\times60}{48}=0.981 \text{ sectional area.}$$

Diameter = 1.11 inches = $1\frac{1}{8}$ inches.

The sectional area of gusset stays, when constructed of triangular right-angled web plates secured to single or double angle bars along the two sides at right angles, shall be determined by formula for diagonal stays, and shall be not less than 10 per cent greater than would be necessary for a diagonal bolt stay.

The diameter of a screw stay shall be taken at the bottom of the thread, provided it is the least diameter of the stay.

For all stays the least sectional area shall be taken in calculating the stress allowable.

All screw stay bolts shall be drilled at the ends with a three-sixteenths-inch hole to at least a depth of one-half inch beyond the inside surface of the sheet. Stays through laps or butt straps may be drilled with larger hole to a depth so that the inner end of said larger hole shall not be nearer than the thickness of the boiler plates from the inner surface of the boiler. Hollow-rolled screw stay bolts may be used.

Flexible stay bolts that are made with a ball in socket on one end, the socket screwed into the outside sheet and covered with a removable cap and bolt screwed into the inside sheet and riveted over, may be used for staying flat surfaces without being drilled with a telltale hole.

Holes for screw stays shall be tapped fair and true, and full thread.

The ends of stays which are upset to include the depth of thread shall be thoroughly annealed after being upset.

The sectional area of pins to resist double shear and bending, accurately fitted and secured in crowfeet, sling, and similar stays, shall be at least equal to eight-tenths of the required sectional area of the brace. Breadth across each side and depth to crown of eye shall be not less than 0.35 of diameter of pin. In order to compensate for inaccurate distribution the forks shall be proportioned to support two-thirds of the load, thickness of forks to be not less than 0.66 of the diameter of pin.

The combined sectional area of rivets used in securing tee irons and crowfeet to shell, said rivets being in tension, shall be not less than the required sectional area of brace. To insure a well-proportioned rivet point, rivets shall be of sufficient length to completely fill the rivet holes and form a head equal in strength to the body of the rivet. All rivet holes shall be drilled. Distance from center of rivet hole to edge of tee irons, crowfeet, and similar fastenings shall be so proportioned that the net sectional areas through sides at rivet holes shall equal the required rivet section. Rivet holes shall be slightly countersunk in order to form a fillet at point and head.

When sling stays are connected by pins to angles secured to shell (see figs. 1 and 2 in sec. 12 of Rule II), said angles shall be of sufficient depth to resist shear. Section to resist shear shall be determined by the following formula:

$$A = D \times 2T$$

$$D = \frac{A}{2T}$$

Where A = sectional area of pin.
D = depth from edge of pinhole to end of leg.
$2T$ = thickness of two angles.

Example.

Diameter of sling stay, 2 inches. Diameter of pin, 1.6 inches. Thickness of angle, seven-eighths of an inch. Required the depth from edge of pinhole to end of leg.

Substituting values and solving:

$$D=\frac{0.7854\times1.6\times1.6}{2\times0.875}=1.15 \text{ inches.}$$

Minimum diameter of rivets shall be found as follows:

$$\text{Minimum diameter}=\sqrt{\frac{\text{load}}{0.7854\times12{,}000\times N}}$$

Where N equals number of rivets. Rivets shall be staggered in each leaf.

TESTS OF BARS FOR STAYS AND BRACES.

All steel bars to be used as stays or braces in marine boilers and allowed a stress of 7,000, 8,000, or 9,000 pounds per square inch of section, tested by the United States inspectors at the mills where the material is manufactured, shall be tested in the following manner: There shall be taken from each heat two pieces for tensile tests and two pieces for bending tests. The full-size bars within the capacity of the testing machine may be used for tensile tests. Where the full size of the bar is too large for the capacity of the testing machine, the bar may be reduced in size to meet such capacity. To facilitate and insure accurate tests, all bars for tensile and bending tests may be reduced in size. The minimum tensile strength of each test piece shall be not less than 58,000 pounds per square inch of section and each test piece that has been reduced in size shall show an elongation of at least 28 per cent in 2 inches. Where the full size of the bar has been used for testing, the test piece shall show an elongation of at least 25 per cent in 8 inches. When the tensile strength of the test piece is more than 63,000 pounds per square inch of section, each test piece that has been reduced in size shall show an elongation of at least 26 per cent in 2 inches. Where the full size of the bar has been used for testing, each test piece shall show an elongation of at least 22 per cent in 8 inches. The pieces for the bend test shall be bent cold to a curve, the inner radius of which is equal to one and one-half times the diameter of the bar without flaws or cracks. Should any such test bar fail in either the tensile or bending test, no bars from such heat shall be allowed to be used in the construction of any marine boiler. Where a heat of steel bars has been passed by an inspector, separate lots of bars from such heat may be furnished to different boiler manufacturers upon a certificate from the mill that the bars were made from such accepted heat.

Boiler manufacturers desiring to use tested steel stays or braces shall be required to furnish the inspectors with the following form of affidavit, duly filled in:

[Form 937.]

STATE OF ——, *County of* ——, *ss:*

I hereby certify that I am the .... of the steam boiler works named ......
(State "owner" or name position.)
situated at ......, in the State of ......, and that the lot or lots of steel bars from which the test bars were taken and tested by the inspector on the ...... day of ...... 19.., and allowed for use in the steam boiler—, to be constructed for the steamer......, and to be allowed a strain not to exceed ...... pounds per square inch of section as a working steam pressure, will be used in the construction of the boiler— for the steamer ......, and no material for any braces, stays, or stay bolts required to be made of tested material and to carry a strain equal to ...... pounds per square inch of section will be used as braces, stays, or stay bolts in the construction of the boiler— for the said steamer unless tested by the inspector and approved by him in accordance with the requirements of law.

(Signature) ....

Subscribed and ...... to before me this ...... day of ......, 19...
(Sworn or affirmed.)

[NOTARY'S SEAL.] (Signature) ....,
Notary Public.

(Secs. 4405, 4418, R. S.)

TOPS OF COMBUSTION CHAMBERS AND BACK CONNECTIONS.

17. Formula for girders over back connection and other flat surfaces:

$$\text{Working pressure} = \frac{C \times d^2 \times T}{(W - P) \times D \times L}$$

Where W = extreme width of combustion box in inches.
P = pitch of supporting bolts in inches.
D = distance between girders from center to center in inches.
L = length of girder in feet between supports.
d = depth of girder in inches.
T = thickness of girder in inches.
$C = 550$ when the girder is fitted with 1 supporting bolt.
$C = 825$ when the girder is fitted with 2 or 3 supporting bolts.
$C = 917$ when the girder is fitted with 4 or 5 supporting bolts.
$C = 963$ when the girder is fitted with 6 or 7 supporting bolts.
$C = 990$ when the girder is fitted with 8 or more supporting bolts.

Example.

Given, $W = 34$ inches, $P = 7.5$ inches, $D = 7.75$ inches, $L = 2.927$ feet, $d = 7.5$ inches, $T = 2$ inches, $C = 825$, then, substituting in formula,

$$\text{Working pressure} = \frac{825 \times 7.5 \times 7.5 \times 2}{(34 - 7.5) \times 7.75 \times 2.927} = 154.3 \text{ pounds.}$$

(Sec. 4418, R. S.)

FLAT SURFACES.

18. All stayed surfaces formed to a curve the radius of which is over 21 inches, excepting surfaces otherwise provided for, shall be deemed flat surfaces.

The maximum stress allowable on flat plates supported by stays shall be determined by the following formula:

$$\text{Working pressure} = \frac{C \times T^2}{P^2}$$

Where P = pitch of stays in inches when equally spaced in both directions.

When pitches of stays are unequal, $\frac{A^2+B^2}{2}$ is to be taken instead of P^2.

Where A = the pitch of stays in inches in one row.
B = distance in inches between two rows of stays.
T = thickness of plates in sixteenths of an inch.
$C = 112$ for screw stays with riveted heads, plates seven-sixteenths of an inch thick and under.
$C = 120$ for screw stays with riveted heads, plates above seven-sixteenths of an inch thick.
$C = 120$ for screw stays with nuts, plates seven-sixteenths of an inch thick and under.
$C = 125$ for screw stays with nuts, plates above seven-sixteenths of an inch thick and under nine-sixteenths of an inch.
$C = 135$ for screw stays with nuts, plates nine-sixteenths of an inch thick and above.
$C = 160$ for stays fitted with washers or doubling strips which have a thickness of at least 0.5 of the thickness of the plate and a diameter of at least 0.5 of the greatest pitch of the stay, riveted to the outside of the plates, and stays having one nut inside of the plate and one nut outside of the washer or doubling strip. For T take 72 per cent of the combined thickness of the plate and washer or plate and doubling strip.
$C = 175$ for stays with double nuts, having one nut on the inside and one nut on the outside of the plate, without washers or doubling plates.
$C = 200$ for stays fitted with doubling plates which have a thickness equal to at least 0.5 of the thickness of the plate reinforced, and covering the full area braced (up to the curvature of the flange, if any), riveted to either the inside or outside of the plate, and stays having one nut outside and one inside of the plates. Washers or doubling plates to be substantially riveted. For T take 72 per cent of the combined thickness of the two plates.
$C = 200$ for stays with plates stiffened with tees or angle bars having a thickness of at least two-thirds the thickness of plate and depth of webs at least one-fourth of the greatest pitch of the stays, and substantially riveted on the inside of the plates, and stays having one nut inside bearing on washers fitted to the edges of the webs that are at right angles to the plate. For T take 72 per cent of the combined thickness of web and plate. (Sec. 4418, R. S.)

NAME PLATES.

19. There shall be fastened to each boiler a plate containing the name of the manufacturer of the material, the place where manufactured, the tensile strength, the name of the builder of the boiler, when and where built.

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The date of the building of the boiler or boilers shall be determined by the month and year of issue of the first certificate of inspection which covers the boiler or boilers in question: *Provided,* That the boiler or boilers have not been used for any purpose previous to the inspection. (Sec. 4418, R. S.)

FUSIBLE PLUGS.

20. Fusible plugs for use in boilers of steam vessels under the jurisdiction of the Steamboat Inspection Service shall be made of a bronze casing with the bore tapering continuously and evenly from end to end, and filled from end to end with tin not less than 99.3 per cent pure and to contain not more than 0.1 per cent zinc, 0.1 per cent lead, or 0.5 per cent copper, and in no case shall it contain more than 0.7 per cent total impurities. The small end of the bore may be countersunk not more than one-fourth of an inch in depth and width, but no recess, thread, or cavity other than this countersink shall be allowed.

Fusible plugs, except those which are hereafter provided for, shall have an external diameter of not less than three-fourths of an inch pipe tap, and the filling shall be at least one-half of an inch in diameter at the smaller end, and shall have a larger diameter at the opposite end of the plug: *Provided, however,* That all fusible plugs fitted in boilers carrying a steam pressure exceeding 150 pounds to the square inch may be reduced at the smaller end of the filling to five-sixteenths of an inch in diameter.

Every boiler other than boilers of the water-tube type shall be fitted with at least two fusible plugs as described above, and located as follows:

Upright boilers shall be fitted with two fusible plugs of an external diameter of not less than three-eighths of an inch pipe tap, the filling to be at least one-fourth of an inch in diameter at the smaller end and shall have a greater diameter at the opposite end. The fusible plugs shall be located in separate tubes not more than 2 inches below the lowest gauge cock.

Externally heated cylindrical boilers, with flues, shall have one plug in the top of the upper flue, not more than 4 feet from the back end of the flue, and shall also have a plug fitted to the shell of the boiler immediately below the fire line, and not less than 4 feet from the front end: *Provided, however,* That when the flues are not more than 6 inches in diameter fusible plugs of not less diameter than three-eighths of an inch pipe tap may be used in such flues.

Fire-box, Scotch, and other types of shell boilers not specially provided for, having a combustion chamber common to all furnaces shall have two plugs fitted to the crown sheet of the combustion chamber at or near the center of the crown sheet and not more than 12 inches apart.

Double-end boilers with separate combustion chambers, each of which combustion chambers is common to all furnaces in its own end of the boiler, shall have two plugs fitted to the crown sheet of each combustion chamber at or near the center of the crown sheet, and not more than 12 inches apart.

Boilers fitted with a separate combustion chamber for each individual furnace shall be fitted with a fusible plug in the center of the crown sheet of each combustion chamber.

Boilers of types not herein provided for shall be fitted with at least two fusible plugs of such dimensions and located in such parts of the boiler as will, in the judgment of the local inspectors, best meet the purposes for which they are intended.

Fusible plugs shall be renewed at each annual inspection, but in cases where the plugs were installed or renewed not more than 6 months prior to the annual inspection, they may be allowed until the next following annual inspection or for a period not to exceed 18 months. In such cases, however, the inspector shall satisfy himself at the annual inspection that the plugs are in such condition as to warrant their continued use until the next annual inspection, after which the plugs shall be renewed at each and every annual inspection.

Fusible plugs shall be so fitted that the smaller end of the filling is exposed to the fire, and shall be at least 1 inch higher on the water side than the plate or flue in which they are fitted.

Notwithstanding anything which may be contained in this rule, fusible plugs shall be so fitted that the end of the filling on the water end of the plug is not less than 1 inch above the dangerous low-water level.

Each manufacturer of fusible plugs shall number all plugs in accordance with the number of the heat from which the plugs were filled. For instance, the first pouring shall be number 1, and all plugs filled from this heat shall be numbered 1; the next pouring shall be number 2, and all the plugs filled from this heat shall be numbered 2, etc.

The heat number shall be plainly stamped on each end of filling with numbers not less than $\frac{1}{12}$ inch in height.

Manufacturers of fusible plugs shall furnish the Supervising Inspector General a sample plug from each heat for examination and test, but where more than 250 plugs are poured from the same heat a sample plug shall be furnished for each 250 plugs or fraction thereof. The samples furnished shall bear the same number for any one heat and shall represent the heat from which the sample is poured.

In transmitting samples of fusible plugs to the Supervising Inspector General, the fusible plugs and the letters of transmittal shall be addressed as follows: "Supervising Inspector General, Steamboat Inspection Service, Department of Commerce, Washington, D. C."

One letter of transmittal shall be required for each heat.

In letter of transmittal the following information shall be stated:

Number of heat.

Number of fusible plugs manufactured from the heat.

Number of samples of fusible plugs from the heat transmitted.

Name of manufacturer or initials stamped on casing of plug.

Manufacturers of fusible plugs shall stamp on the larger end or face of the casing their name or initials for identification and shall file with the Supervising Inspector General of the Steamboat Inspection Service at Washington, D. C., a certificate duly sworn to that such plugs are filled with tin of the character required by this rule and made in accordance therewith.

Following is a general form of affidavit to be followed by manufacturers of fusible plugs:

STATE OF ———, *County of* ———.

I hereby certify, on this ——— day of ———, 192–, that I am ——— ———, of the
(State owner or name position.)
manufactory of ———, at ———, in the State of ———; that all fusible plugs furnished for use in boilers of steam vessels under the jurisdiction of the Steamboat-Inspection Service by the said manufactory will be filled with tin of the character required, and

will be made in accordance with the rules and regulations of the Board of Supervising Inspectors, Steamboat-Inspection Service, governing the manufacture of fusible plugs; and that I am authorized to make this certificate.

——— ———.
(Signature of manufacturer.)

Subscribed and ——— to before me this ——— day of ———, 192–.
(Sworn or affirmed.)

[NOTARY'S SEAL.] (Sign.) ——— ———,
Notary Public.

The certificate shall be executed by some person having authority to make the statements contained therein.

On receipt of a properly executed affidavit by the Supervising Inspector General, the inspectors of the Steamboat Inspection Service and the merchant marine generally shall be notified. (Secs. 4405, 4418, R. S.)

GAUGE COCKS AND WATER GLASS.

21. All boilers, except flash boilers, shall be supplied with at least one reliable water gauge and at least three gauge cocks attached directly to each boiler. When the gauge glass and gauge cocks are connected to the boilers by a water column there shall be three additional gauge cocks inserted in the head or shell of boiler. The lower gauge cock in boilers more than 48 inches in diameter shall be not less than 4 inches above the top of the flues, tubes, or combustion chambers. In boilers less than 48 inches in diameter the lower gauge cock shall be not less than 2½ inches above the top of the flues, tubes, or combustion chambers. A gauge glass shall be considered a reliable water gauge, and a float such as used on western river steamers shall be considered on such boilers as a reliable water gauge: *Provided*, That when water-tube boilers have an efficient water column connected to the steam drum of said boiler at the top and the water manifold at the bottom, and such water column has a gauge glass and three gauge cocks fitted to same, and also is fitted with a valve or stopcock, both at top and bottom where the column is connected to the boiler, no gauge cocks shall be required in the head or shell of the drums of such water-tube boilers.

Double-end boilers shall have at least three gauge cocks and one water glass at each end.

In vertical boilers or boilers of the water-tube type the location of the lowest gauge cock shall be determined by the local inspectors. (Sec. 4418, R. S.)

STEAM GAUGES.

22. All boilers or sets of boilers shall have attached to them at least one gauge that will correctly indicate a pressure of steam equal to 80 per cent of the hydrostatic pressure applied by the inspectors. (Sec. 4418, R. S.)

SAFETY VALVES.

23. After June 30, 1928, no type of safety valve shall be used on any vessel coming under the jurisdiction of this service that has not been approved by the Board of Supervising Inspectors.

The manufacturers of safety valves shall file an affidavit with the Supervising Inspector General that the safety valves manufactured by them will be in all respects in accordance with the blue prints and specifications on file in the office of the Supervising Inspector General and shall permanently attach a name plate to the valves that shall show the name of the manufacturer, the pressure the casing is guaranteed to stand, diameter, seat area, serial number, and capacity.

Before any safety valve is put into service, it shall be subjected to a pressure of one and one-half times the pressure it is to be subjected to when in actual service. (Sec. 4418, R. S.)

Safety valves when fitted either to the shell of boiler or steam drum may be fitted with internal dry pipes when made of standard steam pipe or of riveted material equal in thickness and when the combined openings in the dry pipe equal in area at least one and one-half times the opening of the valve.

The areas of all safety valves on boilers contracted for or the construction of which commenced on or after June 1, 1904, shall be determined in accordance with the following formula and table:

$$\text{Formula: } a = 0.2074 \times \frac{W}{P}$$

Where a = area of safety valve, in square inches, per square foot of grate surface.
W = pounds of water evaporated per square foot of grate surface per hour.
P = absolute pressure per square inch = working gauge pressure + 15.

From which formula the areas required per square foot of grate surface in the following table are found by assuming the different values of W and P.

The figures (a) in table multiplied by square feet of grate surface give the area of safety valve or valves required.

When this calculation results in an odd size of safety valve, use next larger standard size.

Examples.

Boiler pressure = 75 pounds per square inch (gauge).

2 furnaces: Grate surface = 2(No.) × 5 feet 6 inches (long) × 3 feet (wide) = 33 square feet.

Water evaporated per pound of coal = 8 pounds.

Coal burned per square foot grate surface per hour = $12\frac{1}{2}$ pounds.

Evaporation per square foot grate surface per hour = $8 \times 12\frac{1}{2} = 100$ pounds. Hence W = 100 and gauge pressure = 75 pounds.

From table the corresponding value of a is 0.230 square inch.

Therefore area of safety valve = $33 \times 0.23 = 7.59$ square inches.

For which the diameter is $3\frac{1}{8}$ inches nearly.

Boiler pressure = 215 pounds.

6 furnaces: Grate surface = 6(No.) × 5 feet 6 inches (long) × 3 feet 4 inches (wide) = 110 square feet.

Water evaporated per pound coal = 10 pounds.

Coal burned per square foot grate surface per hour = 30 pounds.

Evaporation per square foot grate surface per hour = $10 \times 30 = 300$ pounds.

Hence W = 300, gauge pressure = 215, and $a = 0.270$ (from table).

Therefore area of safety valve = $110 \times 0.270 = 29.7$ square inches, which is too large for one valve. Use two.

$$\frac{29.7}{2} = 14.85 \text{ square inches.} \quad \text{Diameter} = 4\tfrac{3}{8} \text{ inches.}$$

To determine the area of a safety valve for boiler using oil as fuel or for boilers designed for any evaporation per hour:

Divide the total number of pounds of water evaporated per hour by any number of pounds of water evaporated per square foot of grate surface per hour (W) taken from, and within the limits of, the table. This will give the equivalent number of square feet of grate surface for boiler for estimating the area of valve. Then apply the table as in previous examples.

Example.

Required the area of a safety valve for a boiler using oil as fuel, designed to evaporate 8,000 pounds of water per hour, at 175 pounds gauge pressure.

Make W = 200.

$$\frac{8{,}000}{200}=40, \text{ the equivalent grate surface, in square feet.}$$

For gauge pressure = 175 pounds and W = 200, from table, $a=0.218$ square inch. $0.218 \times 40 = 8.72$ square inches, the total area of safety valve required for this boiler, for which the diameter is $3\frac{5}{16}$ inches nearly.

Any spring-loaded safety valve constructed so as to give an increased lift by the operation of steam after being raised from its seat, or any spring-loaded safety valve constructed in any other manner, so as to give an effective area equal to that of the aforementioned spring-loaded safety valve, may be used in lieu of the common lever-weighted valve on all boilers on steam vessels, and each spring-loaded valve shall be supplied with a lever that will raise the valve from its seat a distance of not less than that equal to one-eighth of the diameter of the valve opening; but in no case shall any spring-loaded safety valve be used in lieu of the lever-weighted safety valve without first having been approved by the Board of Supervising Inspectors.

The valves shall be so arranged that each boiler shall have at least one separate safety valve, unless the arrangement is such as to preclude the possibility of shutting off the communication of any boiler with the safety valve or valves employed. This arrangement shall also apply to lockup safety valves when they are employed.

The use of two safety valves may be allowed on any boiler, provided the combined area of such valves is equal to that required by rule for one such valve. Whenever the area of a safety valve, as found by the rule of this section, will be greater than that corresponding to $4\frac{1}{2}$ inches in diameter, two or more safety valves, the combined area of which shall be equal at least to the area required, shall be used.

Where escape pipes for safety valves are installed after July 1, 1926, the area of the escape pipes shall be at least equal to the area of the outlet furnished with the safety valve, and in no case shall the area be less than the area of inlet. The fitting shall be as short and straight as possible, and so arranged as to avoid undue stress upon the valve. Where the escape pipe is used for two or more safety valves, the area of the escape pipe shall equal the combined areas of all the safety valves.

Where safety valves are used with beveled seats, the seats shall have an angle of inclination of 45° to the center lines of their axes.

Table of area of safety valves required per square foot of grate surface for different pressures and rates of evaporation.

P, absolute pressure per square inch.	Gauge pressure per square inch.	These figures represent evaporation in pounds per square foot of grate surface per hour (W)=pounds water evaporated per pound coal×pounds coal burned per square foot of grate surface per hour.														
		100	120	140	160	180	200	220	240	260	280	300	320	340	360	380
		The figures below give *a*, the area in square inches required per square foot of grate surface at the above rate of evaporation.														
65	50	0.319	0.383	0.447	0.510	0.574	0.638	0.702	0.765	0.829	0.893	0.956	....	....	....	....
70	55	.296	.355	.414	.474	.533	.592	.652	.711	.769	.828	.888	....	....	....	....
75	60	.276	.332	.387	.442	.497	.552	.608	.663	.718	.773	.829	....	....	....	....
80	65	.259	.311	.363	.415	.466	.518	.570	.622	.674	.726	.778	....	....	....	....
85	70	.244	.292	.341	.390	.438	.487	.536	.585	.634	.682	.731	....	....	....	....
90	75	.230	.276	.322	.368	.414	.460	.506	.552	.598	.644	.690	....	....	....	....
95	80	.218	.262	.305	.349	.392	.436	.479	.523	.567	.610	.654	....	....	....	....
100	85	.207	.249	.290	.332	.373	.414	.456	.497	.538	.580	.622	....	....	....	....
105	90	.197	.236	.276	.316	.355	.394	.434	.473	.513	.552	.592	....	....	....	....
110	95	.188	.226	.264	.301	.339	.377	.414	.452	.489	.527	.565	....	....	....	....
115	100	.180	.216	.252	.288	.324	.360	.396	.432	.468	.504	.540	....	....	....	....
120	105	.172	.207	.241	.276	.311	.345	.379	.414	.448	.483	.517	....	....	....	....
125	110	.166	.199	.232	.265	.298	.331	.364	.397	.431	.463	.497	....	....	....	....
130	115	.160	.192	.223	.255	.287	.319	.351	.383	.415	.447	.479	....	....	....	....
135	120	.153	.184	.215	.246	.276	.307	.337	.368	.398	.429	.460	....	....	....	....
140	125	.148	.177	.207	.237	.266	.296	.325	.355	.385	.414	.444	....	....	....	....
145	130	.143	.172	.201	.229	.258	.287	.315	.344	.372	.401	.430	....	....	....	....
150	135	.138	.166	.194	.222	.249	.277	.304	.332	.360	.387	.415	....	....	....	....
155	140	.134	.160	.187	.214	.241	.268	.294	.321	.348	.375	.401	....	....	....	....
160	145	.130	.156	.181	.207	.233	.259	.285	.311	.337	.363	.389	....	....	....	....
165	150	.126	.151	.176	.201	.226	.251	.276	.301	.326	.352	.378	....	....	....	....
170	155	.122	.146	.171	.195	.219	.244	.268	.292	.317	.341	.366	....	....	....	....
175	160	.118	.142	.166	.189	.213	.236	.260	.284	.308	.331	.355	....	....	....	....
180	165	.115	.138	.161	.184	.207	.230	.254	.277	.300	.323	.346	....	....	....	....
185	170	.112	.135	.157	.179	.202	.224	.247	.269	.291	.314	.336	....	....	....	....
190	175	.109	.131	.153	.175	.196	.218	.240	.262	.284	.306	.328	....	....	....	....

195	180	.106	.128	.149	.170	.191	.213	.234	.255	.277	.298	.319	....	....	....	....
200	185	.104	.124	.145	.166	.187	.207	.228	.249	.270	.290	.310	....	....	....	....
205	190	.101	.121	.142	.162	.182	.202	.223	.243	.263	.283	.303	....	....	....	....
210	195	.099	.119	.138	.158	.178	.198	.217	.237	.257	.277	.297	....	....	....	....
215	200	.096	.116	.135	.154	.173	.193	.212	.231	.250	.269	.289	0.308	0.327	0.347	0.366
220	205	.094	.113	.132	.151	.170	.189	.208	.226	.245	.264	.283	.302	.321	.340	.358
225	210	.092	.110	.129	.147	.166	.184	.203	.221	.240	.258	.276	.295	.314	.332	.350
230	215	.090	.108	.126	.144	.162	.180	.198	.216	.235	.253	.270	.289	.307	.325	.343
235	220	.088	.106	.124	.141	.159	.176	.194	.212	.229	.247	.264	.282	.300	.318	.336
240	225	.086	.104	.121	.138	.155	.173	.190	.207	.225	.242	.259	.276	.294	.311	.329
245	230	.085	.102	.119	.135	.152	.170	.186	.203	.220	.237	.254	.271	.288	.305	.322
250	235	.083	.100	.117	.133	.149	.167	.183	.199	.216	.233	.249	.266	.282	.299	.315
255	240	.081	.098	.114	.130	.146	.163	.179	.195	.211	.228	.244	.261	.277	.293	.309
260	245	.080	.096	.112	.128	.144	.160	.176	.192	.208	.224	.240	.255	.271	.287	.303
265	250	.078	.094	.110	.125	.141	.157	.172	.188	.203	.219	.235	.250	.266	.282	.298
270	255	.077	.092	.107	.123	.138	.153	.169	.184	.199	.215	.230	.245	.261	.276	.291
275	260	.075	.090	.105	.121	.136	.151	.166	.181	.196	.211	.226	.241	.256	.271	.286
280	265	.074	.089	.104	.118	.133	.148	.163	.178	.192	.207	.222	.237	.251	.266	.281
285	270	.073	.087	.102	.116	.131	.146	.160	.175	.189	.204	.218	.233	.247	.262	.276
290	275	.072	.086	.100	.114	.129	.143	.157	.172	.186	.200	.214	.228	.242	.257	.271
295	280	.070	.084	.098	.112	.127	.141	.154	.169	.182	.196	.210	.224	.238	.253	.267
300	285	.069	.083	.096	.110	.124	.138	.151	.166	.179	.193	.207	.221	.235	.249	.263
305	290	.068	.082	.095	.109	.122	.136	.149	.163	.177	.190	.204	.217	.231	.245	.258
310	295	.067	.080	.093	.107	.120	.134	.147	.160	.174	.187	.201	.214	.227	.241	.254
315	300	.066	.079	.092	.105	.118	.132	.145	.158	.171	.184	.197	.210	.223	.237	250

Flat-seat safety valves may be used under the formula and table under the heading "Safety valves" in Rule II. The discharge capacity of a flat-seat valve shall be 1.4 times that allowed for a bevel-seat valve.

Hereafter no safety valves having a set-screw arrangement on top of the valve casing, designed to hold the valve down while the hydrostatic pressure is being applied, shall be allowed. On such valves now in use, inspectors shall require the set screws to be taken out and the hole permanently closed. This does not apply to any safety valve whose form of construction is such that the hole for the set screw or bolt is securely closed when the valve is locked.

LEVER SAFETY VALVES.

All common lever safety valves to be hereafter applied to the boilers of steam vessels shall be constructed in material, workmanship, and principle according to the requirements for a safety valve referred to in this section. When this construction of a safety valve is applied to the boilers of steamers navigating rough waters, the link may be connected direct with the spindle of the valve: *Provided, always*, That the fulcrum or points upon which the lever rests are made of steel, knife or sharp edged, and hardened; in this case the short end of the lever shall be attached directly to the valve casing. In all cases the link requires but a slight movement not exceeding one-eighth of an inch.

REQUIREMENTS IN CONSTRUCTION OF LEVER SAFETY VALVES.

All the points of bearing on lever shall be in the same plane.

The distance of the fulcrum shall in no case be less than the diameter of the valve opening.

The length of the lever shall not exceed the distance of the fulcrum multiplied by ten.

The width of the bearings of the fulcrum shall be not less than three-fourths of 1 inch.

The length of the fulcrum link shall be not less than 4 inches.

The lever and fulcrum link shall be made of wrought iron or steel and the knife-edged fulcrum points and bearings for the points shall be made of steel and hardened. But the chambers and saddle flanges of this and all other types of safety valves attached to boilers may be made of cast iron or other suitable material.

The valve, valve seat, and bushing for the stem or spindle shall be made of composition (gun metal) when the valve is intended to be attached to a boiler using salt water; but when the valve is to be attached to a boiler using fresh water and generating steam of a high pressure the parts named, with the exception of the bushings for the spindle, may be made of cast iron.

The valve shall be guided by its spindle, both above and below the ground seat and above the lever, through supports either made of composition (gun metal) or bushed with it.

The spindle shall fit loosely in the bearings or supports.

When the valve is intended to be applied to the boilers of steamers navigating rough waters, the fulcrum link may be connected directly with the spindle of the valve; providing always that the knife-edged fulcrum points are made of steel and hardened, and that the vertical movement of the valve is unobstructed by any lateral movement.

In all cases the weight shall be adjusted on the lever to the pressure of steam allowed in each case by a correct steam gauge attached to the boiler. The weight shall then be securely fastened in its position and the lever marked for the purpose of facilitating the replacing of the weight should it be necessary to remove the same, and in no case shall a line or any other device be attached to the lever or weight except in such a manner as will enable the engineer to raise the valve from its seat. (Sec. 4418, R. S.)

WATER-TUBE AND COIL BOILERS.

24. Duplicate blue prints or drawings of water-tube and coil boilers, with their specifications, shall be submitted for approval to the Board of Supervising Inspectors (under sec. 4429, R. S.), and the design approved by said board, before the boilers will be allowed to be used on any vessel coming under the jurisdiction of the Board of Supervising Inspectors. After the approval of the design by the said board, 60 certified sets of the blue prints or drawings shall be furnished the Supervising Inspector General for the use of supervising and local inspectors. The blue prints or drawings necessary to comply with the foregoing provisions shall be supplied by the manufacturers. Manufacturers shall furnish local inspectors of districts where boilers are to be installed an affidavit certifying that the boilers are constructed in accordance with the specifications approved by the Board of Supervising Inspectors. (Sec. 4405, R. S.)

The working pressure allowable on cylindrical shells of water-tube or coil boilers, when such shells have a row or rows of pipes or tubes inserted therein, shall be determined by the following formula: *Provided*, That the working pressure allowable on such shells shall also be determined by the rule for cylindrical shells of boilers constructed of inspected plates, contained in section 2 of Rule II, and the lower working pressure allowable by the two rules shall be taken.

$$P=\frac{(D-d)\times T\times S}{D\times R}$$

Where P = working pressure allowable in pounds.
D = distance in inches between the tube or pipe centers in a line from head to head.
d = diameter of hole in inches.
T = thickness of plate in inches.
S = one-fourth of the tensile strength of the plate.
R = radius of shell in inches.
n = number of tube holes in a pitch. When tubes on any one row are pitched unequally, nd must be substituted in the formula for d.

Where rows of tubes are pitched diagonally, each diagonal ligament shall be not less than three-fifths of each longitudinal ligament.

Example.

Required the working pressure of a cylindrical shell having holes 1 inch in diameter, spaced 2 inches from center to center, in a line from head to head; material, one-half of an inch thick; diameter of shell, 20 inches; tensile strength of plate, 60,000 pounds.

Substituting values, we have

$$P=\frac{(2-1)\times 0.5\times 15{,}000}{2\times 10}=375 \text{ pounds.}$$

PORCUPINE-TYPE BOILERS.

The formula for determining pressure on boilers of the so-called porcupine and similar types shall be as follows:

Multiply the vertical distance between the centers of the horizontal rows of tubes in inches by one-half the diameter of shell of boiler in inches, which gives the area upon which the pressure is exerted to break a diagonal ligament, then find the sectional area of the ligament at its smallest part and multiply by one-sixth the tensile strength of the material. This result divided by the area upon which the strain is exerted gives the working pressure per square inch, which is as follows: $\frac{E\,F\,T}{C\,D}=W$, the working pressure, in which E equals width of ligament in inches, F thickness of material in inches, T one-sixth of the tensile strength, C distance between vertical centers, and D one-half the inside diameter of the shell or central column.

For the boiler proposed, 30 inches diameter, five-eighths inch thick, tensile strength 60,000 pounds, 1.219 inches would be width of ligament, 0.625 thickness of plate, 10,000 one-sixth of tensile strength, $3\frac{11}{16}=3.6875$ inches, distance of vertical centers; 15 inches, one-half the diameter of shell, would be as follows: 1.219 multiplied by 0.625, this product multiplied by one-sixth the tensile strength, 10,000, equals 7,618.75. This product, divided by the product of 3.6875 distance between vertical centers, multiplied by 15, one-half the diameter, equals 55.3125, gives 137.7 as pressure allowed.

HYDROSTATIC PRESSURE.

All coil and pipe boilers hereafter made, when such boiler is completed and ready for inspection, shall be subjected at the first inspection to a hydrostatic pressure at a ratio of 150 pounds to a steam pressure of 100 pounds.

The use of malleable-iron or cast-steel manifolds, tees, return bends, or elbows in the construction of pipe generators shall be allowed, and the pressure of steam shall not be restricted to less than one-half the hydrostatic pressure applied to pipe generators unless a weakness should develop under such test as would render it unsafe in the judgment of the inspector making such inspection.

DRUMS AND HEADS.

All drums attached to coil, pipe, sectional, or water-tube boilers not already in use or actually contracted for, to be built for use on a steam vessel, and their building commenced at or before the date of the approval of this rule, shall be required to have the heads of wrought iron or steel or cast steel flanged and substantially riveted to the drums or secured by bolts and nuts of equal strength with rivets, in all cases where the diameters of such drums exceed 6 inches.

Drums and water cylinders constructed with a bumped head at each or either end, any opening in the shell or heads to be reinforced as required by the rules of the board, the circumferential and horizontal seams to be welded and properly annealed after such welding is completed, and when tested with a hydrostatic pressure of at least double the amount of the steam pressure allowed may be used for marine purposes.

COPPER AND BRASS TUBES.

Seamless copper or brass tubes not exceeding three-fourths of an inch in diameter may be used in the construction of water-tube boilers or generators when liquid fuel is used. There may also be used in their construction copper or brass steam drums not exceeding 14 inches in diameter, of a thickness of material not less than five-eighths of an inch, and copper or brass steam drums 12 inches in diameter and under having a thickness of material of not less than one-half inch. All tubes and drums referred to in this paragraph shall be made from ingots or blanks drawn down to size without a seam. Water-tube boilers or generators so constructed may be used for marine purposes with none other than liquid fuel. (Sec. 4429, R. S.)

WELDING AND REINFORCING BY THE ELECTRIC, OXYACETYLENE, OR OTHER PROCESSES.

25. No repair work by any welding process shall be allowed on marine boilers until coupons showing the character of the work proposed to be done by the applicant shall have been tested and submitted, together with an explanation and report of the test, to the local inspectors of the district where the work is to be done. The local inspectors shall then satisfy themselves whether or not such process can be used with safety on the boilers of steam vessels.

In every case where repairs are to be made by these processes on boilers of steam vessels subject to the inspection of this Service, the engineer in charge and the parties making the repairs are required to notify the office of the local inspectors, giving a full detailed description of the repairs to be made, the location of the vessel, and the time the repairs are to be begun, so that inspection may be had, if practicable, prior to and during the time the work is being done, which reports must be confirmed in writing to the local inspectors.

The application for permission to use this process on boiler repairs of any particular vessel implies a guaranty on the part of the applicant that the work shall, in material, flux, and workmanship, be equal to that of the samples furnished.

The following repairs to marine boilers may be made by any process:

All calking edges on internally fired boilers may be reinforced by these processes.

Calking edges of the shells of externally fired boilers, above the fire line only, may be reinforced, but no welding shall be permitted below the fire line.

Cracks extending from edge of lap to rivet, except on seams below the fire line in externally fired boilers, may be welded.

Cracks not exceeding 30 inches in length in back connection sheets, wrapper sheets, bottoms of combustion chambers, heads, and other stayed surfaces may be repaired by welding.

Where cracks are repaired by welding, holes shall be drilled entirely through the plate at each extreme end of the crack, except in small cracks from rivet to calking edge.

Circumferential or lengthwise cracks not exceeding 20 inches in length in plain or corrugated furnaces may be welded.

Where plates in back sheets of back connections, wrapper sheets of sides and bottoms of back connections of any boilers, side sheets and legs of furnaces and bottoms of furnaces of fire-box boilers, and other stayed surfaces are reduced in thickness not exceeding 40 per cent of the original thickness, they may be reinforced, such reinforcing not to exceed an area of 400 square inches in any one plate.

When such reinforcing extends over stays and braces, such stays and braces shall come completely through the reinforcing so as to be plainly visible to the inspectors.

When the corroded portion of stayed or riveted surfaces of the back sheets or wrapper sheets or bottoms of back connections of any boilers, or side sheets and bottom sheets of furnaces or legs of fire-box boiler exceeds 400 square inches, the same may be repaired by the removal of the corroded portion and the replacement thereof by a new piece of plate, the edges of the new plate being welded in position.

Stay bolts, braces, or rivets shall pass through the body of the new plate as before, the area of the new piece not to exceed 24 by 24 inches, or 30 inches, in any one direction, the welded edges to be V'd or beveled along the joint prior to welding.

Where plates of shells and other parts of internally fired boilers subject to tensile strain are reduced in thickness by corrosion not to exceed 25 per cent of the original thickness, they may be reinforced, such reinforcing not to exceed an area of 200 square inches.

Where calking edges and laps have been reinforced, local inspectors shall require the rivets to be cut out and redriven if they find by inspection that it is necessary, but in no case shall they be calked.

Cracks not exceeding 24 inches in length in the shells of internally fired boilers may be repaired by reinforcing the plate to cover the crack with a piece of tested steel plate of not less than one-fourth inch in thickness, said reinforcing plate to be drilled with three-fourths inch holes not more than 3 inches apart. Such holes in the reinforcing plate shall be countersunk and spot welded through these to the shell of the boiler. The edges of the reinforcing plate shall also be welded to the shell of the boiler. This form of repairs shall only be allowed when made by the electric metallic arc process. Cracks not exceeding 24 inches in length in the shells of externally fired boilers above the fire line and in mud and steam drums may be reinforced by the above process.

Cracks extending through rivet holes in single-riveted or double-riveted seams in stayed surfaces of back connections of any boilers or side sheets of legs or bottoms of fire-box boilers which are stayed surfaces may be welded up to a length of 6 feet exclusive of rivet holes.

Where cracks extend through rivet holes in stayed surfaces, the piece extending from the rivet to the edge of the lap may be removed where convenient to do so, and the place where the piece has been removed may be replaced by being built up and reinforced by either of these processes.

Where leaks develop around stay bolts and the stay bolts are otherwise intact, the nuts may be removed from the ends of the stay bolts, and the stay bolts may be welded into the shell by welding a beveled collar or ring around the stay bolt. The width and depth of such collar shall equal one-half of the diameter of the stay bolt. In all such cases of applying welding rings or collars around stay bolts, the material shall be hammered while in a glowing state as it is applied.

In all cases where metal is deposited on stayed surfaces, the operator shall hammer, when practicable, the deposited metal while it is in a glowing state.

Cracks in wrought-iron or wrought-steel headers, and cracks or sand holes in cast-steel, semisteel, ferrosteel, malleable-iron or cast-iron headers, manifolds, crosses, tees, and ells may be repaired by welding cracks or flowing metal into sand holes. Such repaired material other than headers and manifolds shall be subjected to a hydrostatic test of three and one-half times the working pressure after such repairs are made. Reinforcing by building up of any of the abovementioned articles other than headers shall not be allowed.

When crown-bar bolts have deteriorated or wasted away at top of combustion chamber under the crown bars, such deterioration not to exceed 25 per cent of the original diameter of the bolt, such bolts may be built up or reinforced by any process of autogenous welding.

Where tube sheets of boilers have deteriorated not to exceed 25 per cent of their original thickness, or where cracks have developed in tube sheets, the same may be reinforced and repaired by any process of autogenous welding, and the beading on the ends of tubes may be welded to the tube sheets by the same process.

Any feature of welding not covered by these rules may be accepted and approved by the Supervising Inspector General if, in his opinion, it meets with the obvious intent of the rule. (Secs. 4405, 4418, R. S.)

FEED WATER.

26. Feed water shall not be admitted into any marine boiler at a temperature less than 100° F., and every such boiler, excepting donkey boilers, shall, after October 31, 1909, have an independent auxiliary feed appliance for supplying said boiler with water in addition to the usual mode employed, which auxiliary feed shall enter the boiler through an opening and a fitting which are entirely independent of the fitting and opening for the main feed. (Sec. 4418, R. S.)

MAIN STEAM PIPE.

27. The thickness of and pressure allowed on main steam pipe constructed of riveted iron or steel plates that have been stamped and tested as required by section 4430, Revised Statutes, shall be determined in the same manner as required by section 4433, Revised Statutes, to determine the pressure allowable on boilers.

The thickness of and steam pressure allowable on all lapwelded or solid-drawn steam pipe of wrought iron or steel shall be determined by the following formulas:

$$T=\frac{P\times D}{10{,}000}+0.125$$

$$P=\frac{(T-0.125)\times 10{,}000}{D}$$

Where P = pressure of steam allowable in pounds.
T = thickness of pipe.
D = diameter of pipe.

Example.

Given $P = 200$ pounds pressure. $D = 5$ inches in diameter. Substituting and solving for T,

$$T = \frac{200 \times 5}{10{,}000} + 0.125 = 0.225 \text{ inch.}$$

Substituting and solving for P,

$$P = \frac{(0.225 - 0.125) \times 10{,}000}{5} = 200 \text{ pounds.}$$

WELDED STEAM AND WATER PIPES.

From one-eighth of an inch inside diameter up to and including 30 inches inside diameter.

The pipe shall be made of wrought iron or mild steel, smooth, straight, and free from defects.

Threaded pipe of standard thickness shall be avoided as far as possible. In steam pipes it is a very serious matter and shall not be allowed in any case on standard pipe over 5 inches in diameter.

All pipe over 2 inches in diameter shall be lapwelded.

TESTS.

The following tests shall be made before shipment by the manufacturer:

One-eighth inch inside diameter up to and including 3½ inches inside diameter shall be tested before shipment to 600 pounds per square inch hydrostatic pressure and not subject to any other test.

For all diameters greater than 3½ inches inside:

(*a*) *For steel.*—A test piece 2 inches in length cut from a pipe shall stand being flattened by hammering until the sides are brought parallel with the curve on the inside at the ends not greater than one-third the outside diameter of the pipe without showing cracks or flaws, the weld being 45° from the curve.

For iron.—A test ring three times the thickness in length cut circumferentially from lapwelded wrought-iron pipe shall be crushed down to an inner diameter of one-third the outside diameter of the pipe. Wrought-iron pipe will not stand this test without fracture, but no lapwelded wrought-iron pipe shall be accepted where the break is short or crystalline or shows evidence of defective material or bad welding, and in every case the fiber of the iron shall be shown.

(*b*) Pulling tests shall be made from every 50 pieces furnished, or fraction thereof, and shall show the following results:

For Bessemer steel.—Tensile strength not less than 50,000 pounds per square inch. Elongation in 8-inch specimen, not less than 20 per cent.

For open-hearth steel.—Tensile strength not less than 45,000 pounds per square inch. Elongation in 8-inch specimen, not less than 20 per cent.

For iron.—Tensile strength, 40,000 to 48,000 pounds per square inch. Elastic limit, 22,000 to 30,000 pounds. Elongation in 8-inch specimen, not less than 12 per cent.

All pipe from 4-inch diameter up shall be tested before shipment to not less than 500 pounds per square inch hydrostatic pressure.

SEAMLESS STEEL STEAM AND WATER PIPES.

MATERIAL.

The steel shall be made by the open-hearth process.

SURFACE INSPECTION.

Pipe shall be free, inside and outside, from all surface defects that would materially weaken it or form starting points of corrosion. The defects to be especially avoided are snakes, checks, slivers, laps, pits, etc. Pipe shall be smooth and straight.

TESTS.

The following tests shall be made before shipment by the manufacturer:

(*a*) A test piece, 2 inches in length, cut from a pipe, shall stand being flattened by hammering until the sides are brought parallel with the curve on the inside at the ends not greater than one-third the outside diameter of the pipe, without showing cracks or flaws.

(*b*) Pulling tests shall be made from every 50 pieces furnished, or fraction thereof, and shall show the following results:

Tensile strength, not less than 48,000 pounds per square inch.

Elongation in 8-inch specimen, not less than 12 per cent.

The name or brand of the manufacturer shall be legibly rolled in raised characters or stamped on the outer surface of each pipe.

STATEMENT OR CERTIFICATE OF MANUFACTURER OF STEAM AND WATER PIPES.

When the manufacturers of steam and water pipes file with the Supervising Inspector General a certificate duly sworn to that all such pipes manufactured by them will stand all the tests and meet all the requirements of the foregoing rule, they shall be accepted by inspectors of the service and no other affidavit will be required.

Lapwelded or solid-drawn pipe of wrought iron or steel may be used for mud or steam drums not exceeding 24 inches in diameter for use on boilers when the ends of the pipe have been properly annealed before the holes are drilled or the heads are riveted in.

When pipe is used for steam lines where flanges are riveted on and calked, the ends of the pipe shall be properly annealed before drilling or riveting the flanges on.

FLANGES AND CONNECTIONS FOR WROUGHT-IRON AND HOMOGENEOUS-STEEL FEED AND STEAM PIPE.

The terminal and intermediate flanges of all wrought-iron and homogeneous-steel feed and steam pipe over 2 inches in diameter, other than on pipe or coil boilers or steam generators, shall be made of wrought iron, homogeneous steel, malleable iron having a tensile strength of not less than 30,000 pounds per square inch of section, or equivalent material.

All such flanges shall have a depth through the bore of not less than one-half of the diameter of the pipe to which the flange is attached.

The bore shall increase slightly toward the face of the flange, and the end of the pipe shall be enlarged to fit the bore of the flange, and shall be substantially beaded over or outward into a recess in the face of the flange.

Flanges on extra heavy lapwelded steam pipe up to and including 5 inches diameter may be attached with screw threads and the joints in bends may be made with extra-heavy malleable-iron elbows or equivalent material.

Feed and steam pipe up to and including 3 inches diameter may be connected at intermediate joints by being screwed into flanges or extra-heavy fittings.

Flanges of cast iron, semisteel, or ferrosteel, having a tensile strength of not less than 20,000 pounds per square inch of section, may be employed in connecting extra-heavy lapwelded pipe by screw threads. Such flanges shall be extra heavy and have a depth through the bore of not less than the United States standard length of thread for the pipe to which the flange is attached plus depth of counterbore. The thickness of the flange, excluding hub, shall be not less three-tenths of the diameter of the pipe plus 0.25 of an inch. The pipe shall fit snugly in the counterbore, which shall be not less than one-fourth the diameter of the pipe in depth.

Flanges of wrought iron or steel grooved in the bore to a depth equal to the thickness of the material in the pipe shall be allowed for use on all steam and feed pipe when the end of the pipe has been thoroughly annealed and expanded into the flange by approved machinery.

Flanges with hubs projecting not less than 1¾ inches from the back of the flange may be shrunk on lapwelded or riveted-iron or steel or seamless-drawn steel steam pipes over 5½ inches diameter where the pipe is brought to a true and parallel circle at the end and beaded over into a recess at the face of the flange, or flared to an angle of approximately 20°, or the bore of the flange may be tapered and the pipe expanded into the bore.

Flanges of cast steel, wrought iron, or homogeneous steel, equal in strength to the pipe to which it is attached, may be riveted to the pipe.

Flanges may be secured to pipe by expanding the pipe by proper and approved machinery and flaring the end of the pipe to an angle not exceeding 20°, taken in the direction of the length of the pipe, and having a depth of flare equal to at least one and one-half times the thickness of the pipe.

Flanges of cast steel, forged steel, or wrought iron may be used in any process of expanding the pipe into grooves in the bore of the flange and flaring the end of the pipe to an angle of 20°.

Flanges welded to lapwelded steam pipes of iron or steel may be used when the manufacturer furnishes an affidavit that the pipe has been properly annealed after all work requiring fire has been finished.

All flange connections made by the process of expanding, welding, or shrinking shall be subjected to a hydrostatic test of twice the working pressure without showing signs of weakness.

FLANGES ON COPPER PIPE.

The flanges of all copper steam and feed pipe over 3 inches diameter shall be made of brass or bronze composition, forged-iron or steel or open-hearth steel castings. The end of the pipe shall be flanged over or outward to width of not less than twice the thickness of the pipe and to a radius of not more than the thickness of the pipe, and the flange securely brazed or riveted to the pipe. If the pipe is properly formed with a fully reinforced taper through the flange, the riveting or brazing may be dispensed with. The thickness of flanges shall be not less than four times the required thickness of the pipe plus 0.25 of an inch.

Any form of expanded, grooved, and flared joint will be allowed for copper pipe under the same regulations, restrictions, and tests applying to iron or steel pipe.

All flange joints shall be fitted with such number of bolts or rivets as well make the joint equal in strength to all other parts of the pipe

Any form of joint which, in the judgment of local inspectors, is equal in strength and efficiency to the flange connections required by this rule shall be allowed on any and all classes of pipe.

COPPER PIPE.

No copper pipe constructed after June 30, 1905, shall have any bend whose radius is less than one and one-half times the diameter of the pipe and such pipe shall be so led and flanges so placed that they may be readily taken down if required. Such pipes shall be protected by iron casings when run through coal bunkers, and shall be clear of the coal chutes. The thickness of material, according to the working pressure, shall be determined by the following formula:

$$T=\frac{P\times D}{8,000}+0.0625.$$

Where T = thickness in inches.
P = working pressure.
D = inside diameter of pipe in inches.

Example.

Required the thickness of material of a 5-inch copper pipe for a working pressure of 175 pounds per square inch.

Substituting values, we have

$$T=\frac{175\times 5}{8,000}+0.0625=0.171 \text{ inch.}$$

Provided, however, That all copper pipe subject to pressure and installed for use on steam vessels after July 1, 1911, shall have a thickness of material according to the working pressure, to be determined by the following formula:

$$T=\frac{P\times D}{6,000}+0.0625.$$

Where T = thickness in inches.
P = working pressure.
D = inside diameter of pipe in inches.

Example.

Required the thickness of material of a 5-inch copper pipe for a working pressure of 175 pounds per square inch.

Substituting and solving, we have

$$T=\frac{175\times 5}{6,000}+0.0625=0.208.$$

SLIP JOINTS.

The wearing surface of the male pipe in all slip joints made after June 30, 1908, for use in steam pipes shall be made of copper or composition, and shall be of sufficient length and so adjusted as to prevent accidental withdrawal from the packing box. When made of composition, same shall be of not less than 95 per cent copper, tin, and zinc, possessing a tensile strength of not less than 30,000 pounds to the square inch. It may be used for sizes up to and including 12 inches in diameter, and for all pressures not exceeding 300 pounds per square inch.

The minimum thickness of such fittings shall be determined by the following formula:

$$T=\frac{P\times D}{4,000}+0.22$$

Where P = working pressure in pounds.
D = diameter in inches.
T = thickness in inches.

(Secs. 4405, 4418, R. S.)

CAST STEEL, SEMISTEEL, FERROSTEEL, CAST IRON, MALLEABLE IRON, COMPOSITIONS MADE OF COPPER, TIN, AND ZINC, AND OTHER COMPOSITIONS PROPOSED TO BE USED IN THE MANUFACTURE OF VALVES, FITTINGS, AND OTHER APPLIANCES.

28. Cast-steel fittings of any size or character and for any pressure and for any temperature may be used for any and all steam and feed-pipe connections, and for valves, cocks, and all appliances subject to steam or water pressure, when made by regular processes and by manufacturers who stamp such fittings and appliances with their trade-mark or identifying stamp and who guarantee the castings to possess the following physical characteristics: Tensile strength, minimum, 50,000; maximum, 78,000 pounds per square inch; elastic limit, minimum, not less than 45 per cent of tensile strength; elongation in 2 inches, minimum, 25 per cent. There shall be taken from each heat an annealed coupon or coupons, for the purpose of determining the physical tests, and the manufacturers shall furnish coupons to the local inspectors for tests when so required. All steel castings shall be thoroughly annealed.

The minimum thickness of steel fittings shall be determined by the following formula:

$$T=\frac{P\times D}{7,000}+0.188$$

Where P = working pressure in pounds.
D = diameter in inches.
T = thickness in inches.

Cast iron, semisteel, or ferrosteel, possessing a tensile strength of not less than 22,000 pounds to the sectional square inch, may be used in the construction of valves and fittings for pressures not exceeding 300 pounds when such valves and fittings of 3 inches diameter or over are stamped with the trade-mark or identifying stamp of the manufacturer, and made in accordance with the following formula:

$$T = \frac{P \times D}{3,000} + 0.25$$

Where T = thickness of casting in inches.
P = pressure of steam allowable in pounds.
D = internal diameter of the largest opening contained in the cylindrical part of the casting.

The above materials may also be used in the construction of manhole and handhole plates.

The headers of superheaters may be made of semisteel (so-called) in which the constituent part of high-grade uniform steel thereof shall be not less than 25 per cent and that the material shall have a tensile strength of not less than 28,000 pounds per square inch. The material shall be soft and close-grained and the castings shall be tight under a hydrostatic pressure of 850 pounds per square inch.

Malleable iron possessing a tensile strength of not less than 30,000 pounds to the sectional square inch may be used in the construction of valves and fittings up to and including 6 inches in diameter, and for pressures not exceeding 300 pounds. Such valves and fittings of 3 inches diameter or over shall be extra heavy, the fittings beaded or banded, and the valves and fittings stamped with the trade-mark or identifying stamp of the manufacturer.

Hard brass, bronze, and other compositions, of which 95 per cent is copper, tin, and zinc, possessing a tensile strength of not less than 30,000 pounds to the square inch, may be used in the construction of all valves and fittings up to and including 12 inches in diameter, and for all pressures not exceeding 300 pounds per square inch. All such fittings of 3 inches in diameter or over shall be stamped with the trade-mark or identifying stamp of the manufacturer.

VALVES.

Each and every valve for marine service shall have the trade-mark of the manufacturer cast or stamped on the chamber. All such valves of 2 inches diameter and over shall be subjected by the manufacturer before shipment to a hydrostatic pressure of three and one-half times the working pressure which the manufacturer guarantees them to stand without distortion, and shall also be stamped with such working pressure and also the letters "M. S." which shall plainly indicate that the valve has met the test and requirements for marine service. All valves of over 2 inches diameter, without regard for the service for which they are intended, installed after April 30, 1917, shall have bolted bonnets. Valves of 2 inches diameter or less connected directly to the boiler shall be of cast steel, hard brass, or bronze. Screwed bonnets on cast-iron valves of any size or for any character of service are positively prohibited. On all boilers built after July 1, 1896, a stopcock or valve shall be placed between all check valves and boiler, and between all steam and water pipes and boiler. When interdeck superheaters are used in connection with water-tube boilers of approved design, and the fittings and pipes between the drum of the boilers and the header of the superheaters are made of seamless steel and of a thickness in accordance with the rules to withstand any pressure sustained by any part of the boiler, such fittings connecting with pipes of steam drum or superheater shall be either steel forgings or steel castings. The stop valve may be attached to the discharge end of the superheater: *Provided*, That this section shall not apply to safety valves that have been approved by the Board of Supervising Inspectors.

PIPE FITTINGS.

The term "pipe fittings" refers to all hollow cylindrical fittings, and does not apply to flanges or valves.

All pipe fittings of more than 3 inches internal diameter shall be subjected by the manufacturer to a test of three and one-half times the pressure to which they will be subjected in service.

Where the thickness of the material in the boiler or drum, or the heads thereof, is not less than one-half inch, or where such boiler, drum, or head thereof has been reinforced by having a pad or flange riveted on the same, to make the thickness not less than one-half inch, pipes or fittings of 2 inches in diameter or under may be screwed directly into the same. Where steam or feed pipes of 2 inches in diameter or under are screwed into the boiler, the stop valve shall be connected to the boiler by as short a nipple as it is possible to use, nipples to be of extra-heavy thickness.

All boiler connections of over 2 inches in diameter, except the connections for safety valves shall be permanently flanged and attached directly to the boiler by bolts, studs, or rivets.

Where the connecting point on the boiler is of circular form distance pieces shall be allowed in order to square the point of attachment of the flanged fittings.

Flanged distance pieces of not more than 8 inches between flanges may be allowed between stopcocks or valves and the boiler when necessary to care for and conveniently handle the valves when such distance pieces are constructed of wrought material of sufficient thickness and strength to withstand any pressure to which they may be subjected and securely riveted to the boiler.

Cast-steel flanged fittings, when conforming strictly with the requirements for steel castings, may be used for the purpose of connecting main and auxiliary stop valves and other steam outlets, including safety valves, distance from axis of outlets of such fittings to point of connection with boiler to be as short as practicable.

Valves and fittings of 3 inches and under may be connected by screw threads at their intermediate joints in pipe lines, but at point of connection with boiler all valves and fittings over 2 inches diameter shall be flanged and properly secured by bolts, studs, or rivets, and no fitting shall be of greater length than specified by the "Manufacturers' Standard."

Cast nozzles shall not be used when exposed to the direct action of the fire.

All sea valves or cocks secured to the skin of the vessel by bolts and connected to the engines or boilers by pipes shall be arranged so as to be accessible at all times, so that if a leak or defect occurs it can be reached. All parts of said valves except the chamber shall be made of brass or bronze when used on wooden-hull vessels navigating salt water; but in the case of vessels of iron or steel the brass or bronze bolts may be dispensed with.

ALLOWABLE TEMPERATURES.

Cast iron, malleable iron, semisteel, and ferrosteel may be used in connection with temperatures up to and including 450° F.

Hard brass, bronze, and other compositions of which 95 per cent is copper, tin, and zinc may be used in connection with temperatures up to and including 470° F., but this temperature may be increased to 550° F. when the manufacturer of the valves or fittings stamps them with the temperature they are guaranteed to stand without disintegration. This paragraph will also apply to any composition meeting the above physical requirements and stamped in accordance therewith.

For temperatures exceeding 550° F. no valves or fittings other than steel or of a composition whose tensile strength has been demonstrated to exceed 50,000 pounds per sectional square inch with an elongation of 10 per cent in a length of 2 inches shall be allowed. Such valves and fittings shall be stamped as above required.

The manufacturer of valves and fittings shall file with the Supervising Inspector General a certificate duly sworn to that all valves and fittings furnished by him for use on steam vessels comply with the requirements of the foregoing rule.

After July 1, 1911, local inspectors shall refuse to allow the use of any valves or fittings on steam vessels until notified by the Supervising Inspector General that such certificate is on file in his office. This shall not apply to valves and fittings installed previous to July 1, 1911.

EVAPORATORS, FEED-WATER HEATERS, SEPARATORS, AND STEAM TRAPS MADE OF CAST IRON AND SUBJECT TO BOILER PRESSURE.

When evaporators, feed heaters, separators, and steam traps are constructed of cast iron possessing a tensile strength of not less than 20,000 pounds per square inch, the shells being cylindrical and ends flat or convex, the castings sound and of uniform thickness, the working pressure shall not exceed that found by the following formulas:

Flat surface:

$$P=\frac{20{,}000\times T^2}{D^2}$$

$$T=\sqrt{\frac{P\times D^2}{20{,}000}}$$

Cylindrical shell:

$$P=\frac{3{,}500\times T}{D}$$

$$T=\frac{P\times D}{3{,}500}$$

Where P = working pressure per square inch in pounds.
T = thickness in inches.

Provided, 1. That the thickness of ends of evaporators, feed heaters, and separators shall be not less than three-eighths of an inch. 2. That to the resultant thickness obtained by the formula given above there shall be added for cylinders having an inside diameter of 1 inch to 6 inches, inclusive, one-fourth of an inch; for cylinders having an inside diameter of over 6 inches to 15 inches, inclusive, one-eighth of an inch.

D = diameter inside in inches. When the pressure is to be determined for a part of a flat surface which is a square or rectangle in the flat surface formula, the value of D used shall be the diagonal of the square or rectangle, and when the ends are bolted to the shell the value of D used shall equal the diameter of the bolt circle.

All flanges shall be substantial, and there shall be a good fillet all around the root, and when the ends and shell are cast solid there shall be a good and substantial fillet inside all around.

The bolts or studs for the ends or doors shall not have a greater stress than 6,000 pounds per square inch, and the size of bolts or studs shall be not less than three-fourths of an inch in diameter.

EVAPORATORS.

Evaporators shall be provided with an efficient safety valve of approved type set to blow at the maximum pressure to which the evaporator will be subjected in service, and it shall be the duty of the engineer in charge of the vessel to see that such valve blows off at least once in 30 days. (Sec. 4418, R. S.)

OCEAN.

RULE III.—BOATS, RAFTS, BULKHEADS, AND LIFE-SAVING APPLIANCES.

OCEAN STEAMERS.

1. Under this designation shall be included all steam vessels navigating the waters of any ocean or the Gulf of Mexico more than 20 nautical miles offshore.

For the purpose of apportioning lifeboat, life-raft, and davit equipment upon ocean steam vessels subject to the jurisdiction of the Steamboat Inspection Service, they shall be divided into the following classes:

(*a*) Passenger steam vessels.

(*b*) Passenger steam vessels the keels of which are laid after July 1, 1915.

(*c*) Cargo steam vessels and all other steam vessels navigating the waters of any ocean, unless hereinafter provided for.

DAVITS REQUIRED.

2. Vessels of classes (*a*) and (*b*) shall be equipped with davits in accordance with the following table:

Registered length of ship in feet.	Minimum number of sets of davits.	Minimum number of open boats of the first class.	Minimum capacity of lifeboats.
			Cubic feet.
100 and less than 120	2	2	980
120 and less than 140	2	2	1,220
140 and less than 160	2	2	1,550
160 and less than 175	3	3	1,880
175 and less than 190	3	3	2,390
190 and less than 205	4	4	2,740
205 and less than 220	4	4	3,330
220 and less than 230	5	4	3,900
230 and less than 245	5	4	4,560
245 and less than 255	6	5	5,100
255 and less than 270	6	5	5,640
270 and less than 285	7	5	6,190
285 and less than 300	7	5	6,930
300 and less than 315	8	6	7,550
315 and less than 330	8	6	8,290
330 and less than 350	9	7	9,000
350 and less than 370	9	7	9,630
370 and less than 390	10	7	10,650
390 and less than 410	10	7	11,700
410 and less than 435	12	9	13,060

Registered length of ship in feet.	Minimum number of sets of davits.	Minimum number of open boats of the first class.	Minimum capacity of lifeboats.
			Cubic feet.
435 and less than 460	12	9	14,430
460 and less than 490	14	10	15,920
490 and less than 520	14	10	17,310
520 and less than 550	16	12	18,720
550 and less than 580	16	12	20,350
580 and less than 610	18	13	21,900
610 and less than 640	18	13	23,700
640 and less than 670	20	14	25,350
670 and less than 700	20	14	27,050
700 and less than 730	22	15	28,560
730 and less than 760	22	15	30,180
760 and less than 790	24	17	32,100
790 and less than 820	24	17	34,350
820 and less than 855	26	18	36,450
855 and less than 890	26	18	38,750
890 and less than 925	28	19	41,000
925 and less than 960	28	19	43,880
960 and less than 995	30	20	46,350
995 and less than 1,030	30	20	48,750

The minimum number of sets of davits is fixed in relation to the length of the vessel; provided that a number of sets of davits greater than the number of boats necessary for the accommodation of all the persons on board may not be required.

STRENGTH AND OPERATION OF THE DAVITS.

3. The davits shall be of such strength that the boats can be lowered with their full complement of persons and equipment, the vessel being assumed to have a list of 15 degrees.

The davits shall be fitted with a gear of sufficient power to insure that the boat can be turned out against the maximum list under which the lowering of the boats is possible on the vessel in question.

The Secretary of Commerce is authorized by the seamen's act in specific cases to exempt existing vessels from the requirements of this section that the davits shall be of such strength and shall be fitted with a gear of sufficient power to insure that the boats can be lowered with their full complement of persons and equipment, the vessel being assumed to have a list of 15 degrees, where their strict application would not be practicable or reasonable.

Each set of davits shall have a boat of the first class attached to it, provided that the number of open boats of the first class attached to davits shall not be less than the minimum number fixed by the preceding table.

If it is neither practicable nor reasonable to place on a vessel the minimum number of sets of davits required, a smaller number of sets of davits may be fitted, provided always that this number shall never be less than the minimum number of open boats of the first class required by the table. If a large proportion of the persons on board is accommodated in boats whose length is greater than 50 feet, a further reduction in the number of sets of davits may be allowed exceptionally, if the arrangements are in all respects satisfactory. *Provided, however,* That in all cases in which a reduction in the minimum number of sets of davits or other equivalent appliances required by the rules is allowed, the owner of the vessel in question shall be required to prove, by a test made in the presence of an officer designated by the Supervising Inspector General, that all the boats can be efficiently launched in a minimum time.

The conditions of this test shall be as follows:

First. The vessel is to be upright and in smooth water.

Second. The time is the time required from the beginning of the removal of the boat covers, or any other operation necessary to prepare the boats for lowering, until the last boat or pontoon raft is afloat.

Third. The number of men employed in the whole operation shall not exceed the total number of boat hands that will be carried on the vessel under normal service conditions.

Fourth. Each boat when being lowered shall have on board at least two men and its full equipment as required by the rules.

Fifth. The time allowed for this test shall not exceed 10 minutes.

Vessels of class (*c*) shall be equipped with davits or other practicable means for properly launching the lifeboats.

On and after May 1, 1920, the complete installation of all mechanical boat davits shall be tested and demonstrated for strength and efficiency at the place of manufacture in the presence of an inspector of the Steamboat Inspection Service.

The frame, gear, worms, arms, and all machinery in connection with the operation of the device shall be set up in the shop in the same manner as when installed for use on board the ship and shall be tested in the following manner: A weight equal to the weight of the boat with its equipment and complement of persons that the davit is intended to serve, the weight of the persons being considered as 140 pounds each, shall be suspended from the eye or end of each davit arm, and while the weight is in suspension, the davit arm shall be operated from the inboard position to the full outboard position with the same operating crank or device that is used in actual practice on board the ship. Under this test the davit arm shall show no permanent set or deflection, and the frame, gear, and operating mechanism shall show no distress or distortion. While this test is being conducted, the frame, gear, and operating mechanism, if of cast material, shall be subjected to a test by being well hammered, to satisfy the inspector that the castings are sound and without flaw.

When the assembled installation meets the foregoing requirements and the inspector is satsified that the device is sufficient in strength and operation, he shall stamp the davit arm and the frame to which it is attached, which shall bear identical numbers of the manufacturer, with the letters "U. S. I.," the initials of his name, and a serial number.

When steel castings are employed for frames or davit arms, the castings shall be thoroughly annealed, and the tensile strength of the castings shall be not less than 58,000 pounds nor more than 78,000 pounds per square inch, with an elongation of not less than 20 per cent in a length of 2½ inches measured on the test piece used in determining the tensile stress. The test piece shall have a section 2½ inches in the center turned down to one-half inch diameter. An inspector of this service shall witness this test. Sample pieces shall be a part of the annealed casting and shall represent the casting after it has been thoroughly annealed, and if the casting has afterwards been heated for any purpose it shall be again annealed. The manufacturer shall furnish the inspector, when required, an affidavit setting forth the fact that the required tests respecting annealing have been fully complied with. The davit arm, if of cast material, shall be raised to an angle of 45°, the lower end resting upon the ground, and dropped on a hard unyielding base, and then slung up and subjected to a test by being well hammered with a sledge hammer not less than 7 pounds in weight, to satisfy the inspector that the casting is sound and without flaw. An inspector of the Steamboat Inspection Service shall be present at the foundry where such castings are made, and when the foregoing specifications and tests referred to in this paragraph have been complied with to his satisfaction, he shall stamp the davit arm and the davit frame with the letters "U. S. I.," the initials of his name, and the letters "F. T." indicating that the foundry tests have been complied with.

No davit arm or frame comprising mechanical davits shall be placed on board any vessel until all these requirements have been fully complied with.

After October 31, 1926, all cast-steel mechanical davits carried in stock, which have not been tested as above described, shall be subjected to the drop, hammer, suspension, and turning-out tests, and stamped by an inspector, all as above described, before such davits are accepted as lawful equipment. (Secs. 4405, 4488, R. S.)

LIFEBOATS REQUIRED.

VESSELS OF CLASSES (*a*) AND (*b*).

4. *Vessels of classes* (*a*) *and* (*b*) shall be equipped with lifeboats in accordance with the preceding table, provided that such vessels shall not be required to carry more lifeboat capacity than is necessary to accommodate all persons on board.

If the lifeboats attached to davits do not provide accommodations for the vessel's actual complement of passengers and crew, additional lifeboats of one of the standard types shall be installed to accommodate all persons on board, or to bring the complement of lifeboat capacity up to the minimum provided by the table, or to 75 per cent of the complement of people on board, whichever is the greater.

The remainder of the required equipment shall be provided by lifeboats of one of the standard types or approved life rafts.

MOTOR-PROPELLED LIFEBOATS ON STEAMERS.

5. All ocean steam vessels of more than 2,500 gross tons carrying passengers, whose route at any point lies more than 200 miles offshore, shall carry at least one motor-propelled lifeboat as a part of their required lifeboat equipment: *Provided*, That any vessel under the jurisdiction of the Steamboat Inspection Service may carry one motor-propelled lifeboat as a part of the required lifeboat equipment, but on vessels carrying more than six lifeboats under davits, two of such lifeboats may be motor propelled.

The engine for such motor-propelled lifeboats shall be of a reliable internal-combustion type, and shall be substantially and permanently installed inside the boat. It shall be of sufficient power to propel the boat when loaded to its full capacity at a speed of at least 5 miles per hour in smooth water without favorable current, and shall have an endurance of at least 24 hours under the above conditions.

The motor shall be protected by a water-tight inclosure, the top of which shall be fitted so that it may be removed when necessary, and there shall be fitted in the top a mushroom ventilator.

The motor of each lifeboat shall be operated under service conditions ahead and astern for a period of not less than five minutes once at least in every seven days in order that it may be ready for service at any time. Such operation shall be a part of the lifeboat drill, and the fact of such operation shall be made a part of the report of such drill.

All fittings, pipes, and connections shall be of the highest standard and best workmanship and in accordance with the best modern practice.

The fuel for such motors shall be contained in substantial tanks of seamless steel, welded steel, or copper, securely and firmly fitted in the lifeboat and located where the greatest safety will be secured, and the storage of fuel other than in the lifeboat using it is prohibited.

In computing the cubical capacity of motor-propelled lifeboats the space required for the motor and fuel shall be excluded, and in fixing the air-tank requirements the weight of the motor and its accessories shall be carefully considered in the calculation and allowance made for the extra bouyancy required for such weights. (Secs. 4405, 4488, R. S.)

LIFEBOATS REQUIRED ON VESSELS OF CLASS (*c*).

6. *Vessels of class* (*c*), except cargo vessels hereafter provided for, shall carry sufficient lifeboats to accommodate all persons on board: *Provided*, That vessels engaged exclusively in the business of purse seining may use their wooden seine boats as lifeboats; vessels engaged exclusively in the business of wrecking may use their wooden surf boats as lifeboats; and vessels engaged exclusively in the business of hook-and-line fishing from dories may use their dories as lifeboats: *Provided*, That the dories are fitted with air tanks of sufficient capacity to meet the rule for necessary air-tank equipment.

Cargo vessels shall carry a sufficient number of lifeboats on each side to accommodate all persons on board.

CARRYING OF LIFEBOATS ON VESSELS OF CLASSES (*a*) AND (*b*).

7. All vessels of classes (*a*) and (*b*) except those fitted with mechanical davits, shall, when the weather permits, have one of their lifeboats swung out on each side while at sea, brailed into a boom or rail, and ready for immediate use.

LIFEBOATS REQUIRED ON INSPECTED MOTOR VESSELS.

8. All vessels propelled by machinery other than steam, subject to the inspection laws of the United States, shall be required to have the same lifeboat and life-raft equipment as steamers of the same class, and local inspectors shall so indicate in the certificate of inspection.

Motor vessels under 50 tons, when navigating in daylight only, and when equipped with air tanks under deck of sufficient capacity to sustain afloat the vessel when full of water with her full complement of passengers and crew, or when properly subdivided by iron or steel water-tight bulkheads of sufficient strength and so arranged and located that the vessel will remain afloat with her full complement of passengers and crew with any two compartments open to the sea, shall be required to have not less than 100 cubic feet of lifeboat capacity. (Sec. 4426, R. S.)

LIFEBOATS AND OTHER EQUIPMENT REQUIRED ON SAIL VESSELS.

9. Sail vessels carrying passengers on the ocean under the provisions of section 4417, Revised Statutes, as amended by the act of Congress approved March 3, 1905, shall be subject to the same requirements for lifeboat capacity as ocean steamers of the same class, and in addition thereto they shall be equipped with a life preserver for each and every person on board.

LIFEBOATS AND THEIR EQUIPMENT REQUIRED ON SEAGOING BARGES OF 100 GROSS TONS OR OVER.

10. The lifeboats required on seagoing barges of 100 gross tons or over shall be at least 14 feet long and equipped as follows:

A properly secured life line the entire length on each side, festooned in bights not longer than 3 feet, with a seine float in each bight.

At least two life preservers.

One painter of manila rope of not less than 2¾ inches in circumference and of suitable length.

Four oars of suitable length for size of boat.

Not less than four rowlocks attached to the boat with chains.

One boat hook attached to a staff of suitable length.

One bucket.

On wooden boats there shall be two plugs secured with chains for each drain hole.

EQUIPMENT FOR LIFEBOATS.

11. All lifeboats on ocean steam vessels shall be equipped as follows:

A properly secured life line the entire length on each side, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope, and the seine float in each bight shall hang to within 12 inches of the surface of the water when the boat is light.

One painter of manila rope of not less than 2¾ inches in circumference and of suitable length.

A full complement of oars and two spare oars.

One set and a half of thole pins or rowlocks attached to the boat with separate chains.

One steering oar with rowlock or becket and one rudder with tiller or yoke and yoke lines. In boats of special construction where a rudder is difficult of installation, it may be dispensed with.

One boat hook attached to a staff of suitable length.

Two life preservers.

Two hatchets.

One galvanized-iron bucket with lanyard attached.

One bailer.

Where automatic plugs are not provided there shall be two plugs secured with chains for each drain hole.

One efficient liquid compass with not less than a 2-inch card.

One lantern containing sufficient oil to burn at least nine hours and ready for immediate use.

One can containing 1 gallon of illuminating oil.

One box of friction matches wrapped in a waterproof package and carried in a box secured to the underside of the stern thwart.

A wooden breaker or suitable tank fitted with a siphon, pump, or spigot for drawing water, and containing at least 1 quart of water for each person.

Two enameled drinking cups.

A water-tight receptacle containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread or United States Army ration. The receptacle shall be of metal, fitted with an opening in the top not less than 5 inches in diameter, properly protected by a screw cap made of heavy cast brass, with machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

The United States Army ration above referred to may be any emergency ration of cereal or vegetable compound approved or used by the Army or Navy, but no ration of meat or any ration requiring saline preservative shall be allowed.

One canvas bag containing sailmaker's palm and needles, sail twine, marline, and marline spike.

A water-tight metal case containing 12 self-igniting red lights capable of burning at least two minutes: *Provided*, That one standard 3-cell focusing flash light and 3 extra standard batteries contained in a portable water-tight metal case may be substituted for 6 of the required 12 self-igniting red lights.

A sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so constructed that the oil can be easily distributed on the water and so arranged that it can be attached to the sea anchor.

A mast or masts with one good sail at least and proper gear for each (this does not apply to motor lifeboats), the sail and gear to be protected by a suitable canvas cover. In case of a steam vessel which carries passengers in the North Atlantic and is provided with a radiotelegraph installation, all the lifeboats need not be equipped with masts and sails. In this case at least one of the boats on each side shall be so equipped.

All loose equipment shall be securely attached to the boat to which it belongs.

Lifeboats of less than 180 cubic feet capacity on pleasure steamers are not required to be equipped as above.

STANDARD TYPES OF BOATS.

12. *The standard types of boats classified as follows:*

Class.	Section.	Type.
I. Entirely rigid sides	A. Open	Internal buoyancy only.
	B. Open	Internal and external buoyancy.
	C. Pontoon	Well deck; fixed water-tight bulwarks.
II. Partially collapsible sides	A. Open	Upper part of sides collapsible.
	B. Pontoon	Well deck; collapsible water-tight bulwarks.
	C. Pontoon	Flush deck; collapsible water-tight bulwarks.

DRAWINGS, SPECIFICATIONS, NAME PLATE.

13. All *lifeboats* shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the lifeboats are built.

Builders of lifeboats shall furnish the supervising inspector of the district in which the lifeboats are built drawings, or blue prints, and specifications showing and explaining the construction of same, and showing the tensile strength and ductility of the metal used. The metal used shall have a tensile strength of not less than 40,000 pounds per square inch, and an elongation in a length of 4 inches of at least 20 per cent when the thickness of the metal is of, or greater than, No. 16 B. W. G., and 15 per cent when the thickness of the metal is less than No. 16 B. W. G.

Builders of lifeboats shall affix a plate or other device to each lifeboat, having thereon the builder's name, number of boat, date of construction of boat, cubical contents of boat, and number of persons said boat will carry, as determined by the rules of the Board of Supervising Inspectors. (Secs. 4405, 4488, R. S.)

INSPECTION OF LIFEBOATS WHEN BUILT.

14. Supervising inspectors of districts where lifeboats are built shall detail an assistant or local inspector to any place where lifeboats are being built, whose duty it shall be to carefully inspect and examine the construction of such lifeboats, and he shall satisfy himself that such lifeboats are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the boat, he shall stamp his initials, together with the letters "U. S. I.," on a blank space on the plate required to be affixed to the boat by the builder. The initials of the assistant or local inspector shall be satisfactory evidence to all parties interested that the boat has been constructed in accordance with the drawings, or blue prints, and specifications on file. (Secs. 4405, 4488, R. S.)

BOATS OF THE FIRST CLASS.

CONSTRUCTION OF METALLIC LIFEBOATS OF CLASS 1A.

15. All metallic lifeboats of class 1A shall be constructed in accordance with following specifications:

The keels, stems, sternposts, gunwales, and nosings shall be of clear-grain, sound oak or other suitable wood, each in one length, except that the gunwales and nosings may be made in two lengths. When made in two lengths, the gunwales shall be scarfed with a good long bevel scarf stiffened on the underside by a piece of gunwale material at least 2 feet in length, 1½ inches thick, and the width of the gunwale.

The *stem* of each boat shall be of a natural or steam crook, scarfed at least 9 inches in length on the keel and fastened thereto with two ⅜-inch through clinch bolts driven through deadwood fitted on the inside.

Each *sternpost* shall be stepped over the end of the keel half the length of sternpost and recessed at least 2½ inches deep into keel, the whole to be secured on the inside by a crook or knee of sufficient width to receive the flanges of the shell plates.

Each joint of the stem and sternpost shall be fitted with two ⅜-inch *stopwaters* under the shell flanges. Stem and sternpost shall be bearded to not less than 1½ inches.

The *flanges of shell plates* on boats not over 20 feet long shall lap on the keel, stem, and sternpost at least 2¼ inches; on boats over 20 feet and not over 24 feet long, at least 2½ inches; and on boats over 24 feet long, at least 2¾ inches, to be fairly drawn up and nailed over a strip of No. 6 cotton duck the width of the flanges, which shall be secured by three rows of galvanized nails driven zigzag. No part of the keel, stem, or sternpost outside of the shell flanges shall be covered with sheet metal.

In boats not over 20 feet long the *nails* shall be driven zigzag on lines ⅜, 1⅛, and 1⅞ inches, respectively, from the edge of the flanges and pitched 1¾ inches. In boats over 20 feet and not over 24 feet long the nails shall be driven on lines ⅜, 1¼, and 2⅛ inches, respectively, from the edge of the flanges and pitched 1⅝ inches. In boats over 24 feet long the nails shall be driven on lines ⅜, 1⅜, and 2⅜ inches, respectively, from the edge of the flanges, and pitched 1½ inches.

In boats not over 20 feet long the nails shall be not less than 1¾ inches long, No. 10 B. W. G. In boats over 20 feet and not over 24 feet long the nails shall be not less than 2 inches long, No. 10 B. W. G. In boats over 24 feet long the nails shall be not less than 2½ inches long, No. 9 B. W. G.

Metallic lifeboats of a length not over 20 feet shall be constructed of *plates* of not less thickness than No. 18 B. W. G. Boats over 20 feet and not over 24 feet long shall be constructed of plates of not less thickness than No. 16 B. W. G. Boats longer than 24 feet shall be constructed of plates of not less thickness than No. 14 B. W. G.

All *seams and joints* shall be properly double riveted. The seams and butt laps shall lap at least 1¼ inches.

The center of the row of *rivets* nearest the edge of a sheet shall be about three-eighths of an inch from the edge. Rivets shall be staggered with not less than 18 rivets to the foot, and shall have countersunk heads. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The keels, stems, and sternposts shall be not less than the following sizes:

Length of boat.	Width of keel, stem, and sternpost.	Depth of keel, stem, and sternpost.
	Inches.	*Inches.*
Not over 18 feet	1.8	4.0
Over 18 and not over 20 feet	2.0	5.0
Over 20 and not over 21 feet	2.1	5.0
Over 21 and not over 22 feet	2.2	5.0
Over 22 and not over 23 feet	2.3	5.0
Over 23 and not over 24 feet	2.4	5.0
Over 24 and not over 25 feet	2.5	5.0
Over 25 and not over 26 feet	2.6	5.0
Over 26 and not over 27 feet	2.7	5.0
Over 27 and not over 28 feet	2.8	5.0

The keels of all boats over 26 feet long shall be strengthened by the addition of a main *keelson* extending not less than two-thirds the length of the boat and having one-half the area of the main keel, to which it shall be through fastened with ⅜-inch clinch bolts spaced not more than 14 inches.

Steel having one-sixth the sectional area of wood found by the above table may be used in lieu of wood for keels, stems, and sternposts of metallic lifeboats.

All steel keels, stems, and sternposts shall be painted with two coats of red lead and oil.

The shell plates shall be riveted to the steel keels, stems, and sternposts with button-head rivets of not less than $\frac{3}{16}$ inch in diameter for boats less than 24 feet in length, not less than $\frac{1}{4}$ inch in diameter for boats of 24 feet up to and including 27 feet in length, and not less than $\frac{5}{16}$ inch in diameter for boats from 28 feet up to and including 30 feet in length.

The rivets shall be staggered not less than 12 rivets to the foot.

The shell plating attached to the steel keels, stems, and sternposts shall be laid over flannel or felt and red lead to insure water-tightness. Any form of joint insuring the same result may be approved by the supervising inspector of the district in which the lifeboat is built.

The size of gunwales shall be of not less than the following dimensions:

Length of boat.	Depth of gunwale.	Width of gunwale.
	Inches.	*Inches.*
Not over 18 feet	$1\frac{3}{4}$	2
Over 18 and not over 20 feet	$1\frac{7}{8}$	$2\frac{1}{8}$
Over 20 and not over 22 feet	2	$2\frac{1}{4}$
Over 22 and not over 24 feet	$2\frac{1}{8}$	$2\frac{3}{8}$
Over 24 and not over 26 feet	$2\frac{1}{4}$	$2\frac{1}{2}$
Over 26 and not over 28 feet	$2\frac{3}{8}$	$2\frac{5}{8}$

The gunwales of boats not over 22 feet long shall be attached to the thwarts by steel *braces* at least $1\frac{1}{4}$ inches wide by five-sixteenths of an inch thick, teed 4 inches on the thwarts and secured thereto by two $\frac{1}{4}$-inch carriage bolts, and to the gunwales by a $\frac{1}{4}$-inch bolt clinched over the plate on the outside. In boats over 22 feet long such steel braces shall be at least $1\frac{1}{2}$ inches by three-eighths of an inch, teed 5 inches on the thwarts and secured thereto by three $\frac{1}{4}$-inch carriage bolts, and to the gunwales by $\frac{5}{16}$-inch bolts clinched over the plate on the outside. All sheer plates shall come up on the gunwale to within one-half inch of its top and be nailed thereto with $1\frac{1}{2}$-inch boat nails spaced 6 inches.

Angle-bar steel gunwales may be used for all lifeboats when the cross-sectional area of the same is of at least one-sixth the cross-sectional area of the wooden gunwale as now specified and required, subject to the suspension test required of lifeboat when loaded with its full complement of persons and equipment.

All *nosings* shall be formed of so-called half rounds, mitered to fit fairly against the gunwales and sheer plates, through which they shall be nailed to the gunwales every 6 inches with wire nails of No. 10 gauge and not less than $2\frac{3}{4}$ inches long. The flat side of nosings on boats of not over 20 feet long shall be not less than $1\frac{3}{8}$ inches wide and five-eighths of an inch thick. On boats over 20 feet and not over 24 feet long the flat side of the nosing shall be not less than $1\frac{7}{8}$ inches wide and 1 inch thick through the round. On all boats over 24 feet long the flat side of the nosing shall be not less than $2\frac{1}{4}$ inches wide and 1 inch thick through the round.

All *thwarts* shall be made of clear yellow pine or fir.

In boats not over 20 feet long thwarts shall be at least 1⅛ inches thick by 7½ inches wide. In boats over 20 feet and not over 24 feet long they shall be at least 1¼ inches thick by 8 inches wide. In boats over 24 feet long they shall be 1⅜ inches thick by 9 inches wide. All thwarts over 4½ feet long shall be supported by *stanchions* of pine of 1 inch by 5 inches. Every thwart shall be secured at each end to the boat by a double or U flange of No. 16 plate riveted to the shell with five rivets. The thwarts shall be pushed in between those flanges and secured thereto by five boat nails driven down through the upper flanges, thwarts, and lower flanges, and turned over beneath.

Breasthooks formed of steel for boats not over 20 feet long shall be one-fourth inch thick and 1¼ inches wide. In boats over 20 feet and not over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1⅜ inches wide. In boats over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1½ inches wide.

No breasthooks shall be less than 9 inches long.

Breasthooks shall be fastened through the gunwales each side with three one-fourth inch button-head bolts clinched over the shell plate. All such breasthooks shall be upset in the throat sufficient to allow the upper bolt through the ring strap to pass through the hook without reducing the sectional area thereof.

The *midship footings* in boats not over 18 feet long shall be not less than seven-eighths of an inch thick and have two footings on each side, which footings shall be seven-eighths of an inch thick by 7 and 5 inches wide, respectively. The midship footings in boats over 18 feet and not over 24 feet long shall be not less than 1 inch thick by 12 inches wide and have three footings on each side, which shall be 1 inch thick by 7, 6, and 4 inches, respectively, in width. The midship footings in boats over 24 feet and not over 26 feet long shall be not less than 1 inch thick and 12 inches wide, and such boats shall have not less than three footings on each side, each to be not less than 1 inch thick by 7, 6, and 4½ inches, respectively, in width. Boats over 26 feet long having a keelson shall have three footings on each side 1 inch thick by 8, 6, and 5 inches, respectively, in width. All said footings shall be fitted fairly to the bottom over a coat of lead paint and held in place by straps of No. 18 plate, 1⅛ inches wide, riveted with four rivets to the boat shell. The strap shall pass up through an aperture in the middle of each footing and receive a toggle of gas pipe five-eighths of an inch in diameter and of a length not less than two-thirds of the width of the footing. There shall be not less than four such toggles in each footing in boats not over 20 feet long, nor less than five such toggles in boats over 20 feet and not over 24 feet long. In boats over 24 feet long there shall be six such toggles in each footing. The midship footings shall be secured to the bottom by straps and toggles in two rows placed 3 inches from each edge of the footing, and fastened with toggles of one-half-inch pipe 3½ inches long. Hardwood toggles may be used in lieu of pipe when the same are formed of oak of so-called half rounds, 1 inch on their flat side and three-fourths of an inch thick. Iron or steel of so-called half round not less than five-eighths of an inch on the flat side and not less than three-sixteenths of an inch thick may also be used for toggles.

The *tackle rings* in boats not over 18 feet long shall be formed of not less than ⅝-inch round steel. In boats over 18 feet and not over 22 feet long such rings shall be formed of not less than ¾-inch round steel. In boats over 22 feet and not over 26 feet long such rings shall be formed of not less than $\frac{13}{16}$-inch round steel. In boats over 26 feet long such rings shall be formed of not less than $\frac{7}{8}$-inch round steel. Such rings shall be welded through eyes of equal strength in the ring straps, which straps shall have a sectional area on each side of the upper bolt hole equal to that of the ring, and the sectional area of strap on each side of the next bolt hole shall be two-thirds that of such ring, and on each side of the next row of bolt holes one-half that of such ring. *Hooks* may be allowed in lieu of rings when constructed of equal strength to rings and attached to the boat as securely as the rule provides for rings.

The pitch of bolt holes in all such straps shall be 3 inches.

In boats not over 18 feet long said ring straps shall be secured with three bolts $\frac{1}{2}$ inch in diameter. In boats over 18 feet and not over 22 feet in length such ring straps shall be secured by three bolts $\frac{5}{8}$ inch in diameter. In boats over 22 feet and not over 26 feet long such ring straps shall be secured by four bolts $\frac{5}{8}$ inch in diameter. In boats over 26 feet long such ring straps shall be secured by five bolts, the upper two of which shall be $\frac{5}{8}$ inch in diameter and the other three $\frac{9}{16}$ inch in diameter. The two upper bolts shall be driven through and clinched on the outer edge of the stem and sternpost. The lower bolt or bolts may be driven blunt $3\frac{1}{2}$ inches into the stem and sternpost. The upper bolts shall pass through the breasthooks.

Each and every lifeboat shall be fitted with a *painter ring* properly secured, of a size and strength not less than that specified for tackle rings.

All boats shall have a *mean sheer* of at least 4 per cent of the length. This paragraph shall not apply to lifeboats constructed prior to November 4, 1915.

All boats shall be fitted with *rudders* made of clear, straight-grained oak or fir, which shall be stiffened across the bottom edge by a piece of wood of the same character, properly nailed.

All gudgeons and pintles shall be strapped to the wood and through fastened, and be so adjusted that the lower pintle will project at least $1\frac{1}{2}$ inches more below its gudgeon than does the upper one.

Each lifeboat shall be fitted with an *automatic plug*.

All the shell plates, air tanks, nails, gunwale braces, rudder braces, and fastenings of metallic boats shall be *galvanized* when said parts are made of steel or iron.

The *gauge numbers* referred to in Rule III are the Birmingham standard (B. W. G.). (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF WOODEN LIFEBOATS.

16. Wooden lifeboats shall be substantially constructed and in every way equal in strength and stability to a metallic boat built in accordance with the above specifications. (Sec. 4488, R. S.)

1B. OPEN BOATS WITH INTERNAL AND EXTERNAL BUOYANCY.

17. The internal buoyancy of a wooden boat of this type shall be provided by water-tight air cases, the total volume of which is at least equal to $7\frac{1}{2}$ per cent of the cubic capacity of the boat.

The external buoyancy may be of cork or of any other equally efficient material, but such buoyancy shall not be secured by the use of rushes, cork shavings, loose granulated cork, or any other loose granulated substance, or by any means dependent upon inflation by air.

If the buoyancy is of cork, its volume, for a wooden boat, shall not be less than thirty-three thousandths of the cubic capacity of the boat; if of any material other than cork, its volume and distribution shall be such that the buoyancy and stability of the boat are not less than that of a similar boat provided with buoyancy of cork.

The buoyancy of a metal boat shall be not less than that required above for a wooden boat of the same cubic capacity, the volume of the air cases and external buoyancy being increased accordingly.

Boats of this class shall have a mean sheer equal to at least 4 per cent of their length.

LUNDIN AND LANE LIFEBOATS.

18. *Lundin decked lifeboats and Lane decked metallic lifeboats* shall be accepted as equivalent to Class 1A lifeboats and shall be rated and accepted as lifeboats under davits, and may be placed in nests of two under a single pair of davits, but such nesting shall not commence until each set of davits as required by law is first fitted with a required lifeboat. They shall be fully equipped as lifeboats as required by these rules and regulations and shall be measured in accordance with the following formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic foot}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = depth from top of keel to top of gunwale, in feet.

Example.

28 feet × 9.5 feet × 2.5 feet × 0.9 = 598.5 cubic feet.

Allow 10 cubic feet to a person, 598.5 ÷ 10 = 59 persons.

Provided, That when the Lundin decked lifeboats and Lane decked metallic lifeboats are loaded to their full capacity the water-tight deck shall be not less than 2 inches above the load water line, and shall have an excess buoyancy in air space and fenders of not less than 25 per cent of the combined weight of boat and load. Not less than 10 per cent of the total buoyancy shall be in fenders of buoyant material firmly secured to the outside of the boat.

The following example is given in explanation of the above proviso:

Example.

26 feet, 50 persons, Lundin decked lifeboat or Lane decked metallic lifeboat.

Height of load water line, 15 inches. Required height of inner deck = 15 inches + 2 inches = 17 inches. Combined weight of boat and load (each person allowed figured at 165 pounds), 12,250 pounds. Excess buoyancy required in air space and fenders above = 0.25 × 12,250 = 3,062.5 pounds. Total buoyancy required, i. e., buoyancy of air space below water-tight deck plus buoyancy of entire fenders, = 12,250 + 3.062.5 = 15,312.5 pounds. Buoyancy required in entire fenders = 0.10 × 15,312.5 = 1,531.25 pounds.

The carrying capacity of the Lundin *power* lifeboat shall be determined by the same rule as the Lundin decked lifeboat and Lane decked metallic lifeboat, with proper reduction for the weight and space used for the motors, tanks for fuel, and wireless apparatus.

The carrying capacity of the Lundin *housed* lifeboat shall be determined by the same rule as the Lundin decked lifeboat and Lane decked metallic lifeboat.

Lundin semidecked lifeboats shall be accepted as equivalent to Class 1A lifeboats and shall be rated and accepted as lifeboats under davits, and may be placed in nests of two under a single pair of davits, but such nesting shall not commence until each set of davits as required by law is first fitted with a required lifeboat. They shall be fully equipped as lifeboats as required by these rules and regulations, and shall be measured in accordance with the following formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic foot}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = depth from top of keel to top of gunwale, in feet.

Example.

20 feet × 7 feet × 2 feet × 0.9 = 252 cubic feet.

Allowing 10 cubic feet to a person, 252 ÷ 10 = 25 persons.

Provided, That the length of the Lundin semidecked lifeboat does not exceed 24 feet; that the above boat is provided with independent air tanks, placed at the sides of the boat, built in accordance with the general rules for air tanks of lifeboats and with a capacity of not less than 1½ cubic feet for each person allowed; that the above boat is provided with built-in water-tight compartments, one in each end, and provided with a water-tight manhole, and that not less than 10 per cent of the volume of the displacement to the load-water line shall be in fenders of buoyant material firmly secured to the outside of the boat.

The Lundin *open* lifeboat with balsa-wood fenders, 24 feet in length, 7 feet 1 inch in breadth inside fender, 8 feet in breadth outside fender, and 3 feet 2 inches in depth, shall be allowed to carry 40 persons. The number of persons allowed to be carried on boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

BOATS EQUIVALENT TO BOATS OF CLASS 1B.

19. Any type of boat may be accepted as equivalent to a boat of class 1B after blue prints and specifications have been submitted and a practical demonstration of a full-size boat is witnessed by the Board of Supervising Inspectors.

1C. PONTOON BOATS, IN WHICH PERSONS CAN NOT BE ACCOMMODATED BELOW THE DECK, HAVING A WELL DECK AND FIXED WATER-TIGHT BULWARKS.

20. The area of a well deck of a boat of this type shall be at least 30 per cent of the total deck area. The height of the well deck above the water line at all points shall be at least equal to one-half per cent of the length of the boat, this height being increased to 1½ per cent of the length of the boat at the ends of the well.

The freeboard of a boat of this type shall be such as to provide for a reserve buoyancy of at least 35 per cent.

BOATS OF THE SECOND CLASS.

21. The standard types of boats of the second class shall satisfy the following conditions:

2A. OPEN BOATS HAVING THE UPPER PART OF THE SIDES COLLAPSIBLE.

22. A boat of this type shall be fitted both with water-tight air cases and with external buoyancy, the volume of which, for each person which the boat is able to accommodate, shall be at least equal to the following amounts: Air cases, $1\frac{5}{10}$ cubic feet; external buoyancy (if of cork), $\frac{2}{10}$ cubic foot.

The minimum freeboard of boats of this type is fixed in relation to their length; it is measured vertically to the top of the solid hull at the side amidships, from the water level when the boat is loaded.

The freeboard in fresh water shall not be less than the following amounts:

Length of the boat.	Minimum. freeboard.
Feet.	*Inches.*
26	8
28	9
30	10

The freeboard of boats of intermediate lengths is to be found by interpolation.

2B. PONTOON BOATS HAVING A WELL DECK AND COLLAPSIBLE BULWARKS.

23. All the conditions laid down for boats of type 1C are to be applied to boats of this type, which differ from those of type 1C only in regard to the bulwarks.

2C. PONTOON BOATS, IN WHICH THE PERSONS CAN NOT BE ACCOMMODATED BELOW DECK, HAVING A FLUSH DECK AND COLLAPSIBLE BULWARKS.

24. The minimum freeboard of boats of this type is independent of their lengths and depends only upon their depth. The depth of the boat is to be measured vertically from the underside of the garboard strake to the top of the deck at the side amidships, and the freeboard is to be measured from the top of the deck at the side amidships to the water level when the boat is loaded.

The freeboard in fresh water shall not be less than the following amounts, which are applicable without correction to boats having a mean sheer equal to 3 per cent of their length:

Depth of boat.	Minimum. freeboard.
Inches.	*Inches.*
12	$2\frac{3}{4}$
18	$3\frac{3}{4}$
20	$5\frac{1}{8}$
30	$6\frac{1}{2}$

For intermediate depths the freeboard is obtained by interpolation.

If the sheer is less than the standard sheer defined above, the minimum freeboard is obtained by adding to the figures in the table one-seventh of the difference between the standard sheer and the actual mean sheer measured at the stem and sternpost. No deduction is to be made from the freeboard on account of the sheer being greater than the standard sheer or on account of the camber of the deck.

Pontoon lifeboats may be built of wood or metal. If constructed of wood, they shall have the bottom and deck made of two thicknesses with textile material between; if of metal, they shall be divided into water-tight compartments, with means of access to each compartment.

ARRANGEMENTS FOR CLEARING PONTOON LIFEBOATS OF WATER.

25. All pontoon lifeboats shall be fitted with efficient means for quickly clearing the deck of water. The orifices for this purpose shall be such that the water can not enter the boat through them when they are intermittingly submerged. The number and size of the orifices shall be determined for each type of boat by a special test.

For the purpose of this test the pontoon boat shall be loaded with a weight of iron or bags of sand equal to that of its complement of persons and equipment.

In the case of a boat 28 feet in length, 2 tons of water shall be cleared from the boat in a time not exceeding the following: Type 1C, 60 seconds; type 2B, 60 seconds; type 2C, 20 seconds.

TYPE OF BOAT EQUIVALENT TO BOAT OF CLASS II.

26. Any type of boat may be accepted as equivalent to a boat of class II after blue prints and specifications have been submitted to, and a practical demonstration of a full-size boat has been witnessed by, and the type of boat has been approved by, the Board of Supervising Inspectors.

BRUDE LIFEBOAT.

27. Lifeboats of the Brude type, of the sizes specified below, for use on cargo steamers, shall be allowed the following rating:

Length.	Height.	Width.	Number of persons carried and allowed on cargo steamers.
Feet.	*Ft. in.*	*Ft. in.*	
18	8 0	8 0	34
14	6 9	6 9	17

The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

CAPACITY AND ALLOWANCE OF ENGELHARDT COLLAPSIBLE LIFEBOATS.

28. Engelhardt collapsible lifeboats may be carried as lifeboats and rated as class 2C, and shall be fully equipped as lifeboats as required by these rules.

The cubic capacity of Engelhardt collapsible lifeboats shall be determined in accordance with the following rule: Measure in feet and fractions of a foot the length and breadth outside of canvas extension and the depth inside at the place of minimum depth taken from the inside of the bottom planking of the bottom to the top of gunwale when extended. The product of these dimensions multiplied by 0.7 shall be deemed the capacity in cubic feet. (Sec. 4488, R. S.)

NEWCOMB INCLOSED LIFEBOAT.

29. Lifeboat of this type, 26 feet in length, 6 feet 4 inches in breadth, and 3 feet 4 inches in depth, when constructed in accordance with the rules for lifeboats, shall be allowed to carry 25 persons.

The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

AIR TANKS OF LIFEBOATS.

30. All lifeboats contracted for after September 30, 1912, shall have not more than 50 per cent of the air-tank capacity in the ends of the boat and the remaining capacity shall be located in the side tanks.

After June 20, 1912, the air tanks of all lifeboats shall be entirely independent of the hull or other construction and shall be of suitable noncorrosive material and of a capacity of not less than 1.5 cubic feet for each person allowed in metallic boats and not less than 1 cubic foot for each person allowed in wooden boats. Such air tanks shall be firmly and securely fastened in the hull, and in such manner as will allow them to be temporarily removed, and in no case shall the tanks be punctured or opened for such fastenings. The tops of such tanks shall be thoroughly protected by a grating or platform or by the thwarts or seats. Such air tanks of 6 cubic feet or less shall be constructed of material of a thickness not less than No. 22 B. W. G.; from 6 cubic feet to and including 15 cubic feet, of a thickness not less than No. 20 B. W. G.; and all air tanks of more than 15 cubic feet capacity shall be of a thickness not less than No. 18 B. W. G.

All joints of air tanks shall be properly double riveted and tightly calked or securely hook jointed and efficiently soldered or properly and securely welded, and such air tanks shall be located in such a manner that will permit the lifeboat to be on as near an even keel as possible when flooded with water.

The cubical contents of air space of air tank shall be stamped on the tank where same can be seen when air tank is placed in boat.

All air tanks shall be fitted with a connection of one-half inch outside diameter for testing purposes.

Before any lifeboat is passed and accepted, the air tanks thereof shall be tested in the presence of an inspector of this service by an air pressure of not more than 1 pound to the square inch. At each subsequent annual inspection, or oftener if in the opinion of the inspectors it is necessary or desirable, the inspectors shall satisfy themselves that the tanks are in good condition, but pressure need not be applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Secs. 4405, 4488, R. S.)

CUBIC CAPACITY OF OPEN BOATS OF THE FIRST CLASS.

31. First. The cubic capacity of an open boat of type 1A or 1B shall be determined by *Stirling's* (*Simpson's*) *rule* or by any other method, approved by the Board of Supervising Inspectors, giving the same degree of accuracy. The capacity of a square-sterned boat shall be calculated as if the boat had a pointed stern.

Second. For example, the capacity in cubic feet of a boat, calculated by the aid of Stirling's rule, may be considered as given by the following formula:

$$\text{Capacity} = \frac{l}{12}(4A + 2B + 4C)$$

being the length of the boat in feet from the inside of the planking or plating at the stem to the corresponding point at the sternpost; in the case of a boat with a square stern, the length is measured to the inside of the transom. A, B, C denote, respectively, the areas of the cross sections at the quarter length forward, amidships, and the quarter length aft, which correspond to the three points obtained by dividing l into four equal parts. (The areas corresponding to the two ends of the boat are considered negligible.)

The areas A, B, C shall be deemed to be given in square feet by the successive application of the following formula to each of the three cross sections:

$$\text{Area} = \frac{h}{12}(a + 4b + 2c + 4d + e)$$

h being the depth measured in feet inside the planking or plating from the keel to the level of the gunwale, or, in certain cases, to a lower level, as determined hereafter. a, b, c, d, e denote the horizontal breadths of the boat measured in feet at the upper and lower points of the depth and at the three points obtained by dividing h into four equal parts (a and e being the breadths at the extreme points, and c at the middle point, of h).

Third. If the sheer of the gunwale, measured at the two points situated at a quarter of the length of the boat from the ends, exceeds 1 per cent of the length of the boat, the depth employed in calculating the area of the cross sections A or C shall be deemed to be the depth amidships plus 1 per cent of the length of the boat.

Fourth. If the depth of the boat amidships exceeds 45 per cent of the breadth, the depth employed in calculating the area of the midship cross section B shall be deemed to be equal to 45 per cent of the breadth; and the depth employed in calculating the areas of the quarter-length sections A and C is obtained by increasing this last figure by an amount equal to 1 per cent of the length of the boat, provided that in no case shall the depths employed in the calculation exceed the actual depths at these points.

Fifth. If the depth of the boat is greater than 4 feet, the number of persons given by the application of this rule shall be reduced in proportion to the ratio of 4 feet to the actual depth, until the boat has been satisfactorily tested afloat with that number of persons on board, all wearing life jackets.

Sixth. The following rule may be used, provided it does not give a greater capacity than that obtained by the above method: Measure the length and breadth outside of the planking or plating and the depth inside at the place of minimum depth. The depth used in calculating shall not in any case exceed 45 per cent of the breadth. The product of these dimensions multiplied by 0.6 resulting in the nearest whole number shall be deemed the capacity in cubic feet.

To determine the number of persons a boat may carry, divide the result by 10 for ocean steam vessels.

Example.

The carrying capacity of a boat 22 feet in length, 6 feet in breadth and 2½ feet in depth shall be determined as follows:

$$\frac{22\times 6\times 2\frac{1}{2}\times 0.6}{10}=\frac{198}{10}=19 \text{ persons.}$$

In all cases the vessel owner has the right to require that the cubic capacity of the boat shall be determined by exact measurement.

Seventh. The cubic capacity of a *motor boat* is obtained by deducting from the gross capacity a volume equal to that occupied by the motor and its accessories.

DECK AREA OF PONTOON BOATS AND OPEN BOATS OF THE SECOND CLASS

32. First. The area of the deck of a pontoon boat of type 1C, 2B, or 2C shall be determined by the method indicated below or by any other method giving the same degree of accuracy. The same rule is to be applied in determining the area within the fixed bulwarks of a boat of type 2A.

Second. For example, the surface in square feet of a boat may be deemed to be given by the following formula:

$$\text{Area}=\frac{l}{12}(2a+1.5b+4c+1.5d+2e)$$

l being the length in feet from the intersection of the outside of the planking with the stem to the corresponding point at the sternpost, a, b, c, d, e denote the horizontal breaths in feet outside the planking at the points obtained by dividing l into four equal parts and subdividing the foremost and aftermost parts into two equal parts (a and e being the breadths at the extreme subdivisions, c at the middle point of the length, and b and d at the intermediate points).

The minimum cubic capacity of open boats of type 1A shall be not less than 10 cubic feet for each person.

The minimum cubic capacity of open boats of type 2B shall be not less than 9 cubic feet for each person.

The minimum deck capacity for open boats of type 2A and pontoon boats of type 2C shall be not less than 3½ square feet, and of pontoon boats of types 2B and 1C not less than 3¼ square feet.

If after a practical demonstration it is found that there is a greater seating capacity than is allowed by the above, the number of square feet may be reduced, but never less than 3 square feet for each person.

CAPACITY LIMITS.

33. Pontoon boats and pontoon rafts shall never be marked with a number of persons greater than that obtained in the manner specified in this section.

This number shall be reduced—

First. When it is greater than the number of persons for which there is proper seating accommodation, the latter number being determined in such a way that the persons when seated do not interfere in any way with the use of the oars.

Second. When in the case of boats other than those of the first two sections of the first class, the freeboard, when the boat is fully loaded, is less than the freeboard laid down for each type respectively. In such circumstances the number shall be reduced until the freeboard, when the boat is fully loaded, is at least equal to the standard freeboard laid down above.

In boats of types 1C and 2B the raised part of the deck at the sides may be regarded as affording seating accommodation.

EQUIVALENTS FOR AND WEIGHT OF THE PERSONS.

34. In test for determining the number of persons which a boat or pontoon raft can accommodate each person shall be assumed to be an adult person wearing a life preserver.

In verifications of freeboard the pontoon boats shall be loaded with a weight of at least 165 pounds for each adult person that the pontoon boat is authorized to carry.

In all cases two children under 12 years of age shall be reckoned as one person.

MARKING OF LIFEBOATS.

35. All lifeboats shall have the number of boat plainly marked or painted on each bow, in figures not less than 3 inches high. Where lifeboats are carried on both sides of a vessel, lifeboat No. 1 shall be forward on starboard side of vessel, lifeboat No. 2 forward on port side, lifeboat No. 3 next abaft lifeboat No. 1 on starboard side, lifeboat No. 4 next abaft lifeboat No. 2 on port side, and so forth, the odd-numbered boats being on the starboard side and the even-numbered boats being on the port side of vessel. All lifeboats shall have their cubic contents and the number of persons such lifeboat is allowed to carry plainly marked or painted on each bow in letters and figures not less than three-fourths of an inch high. All lifeboats shall also have the number of persons allowed to be carried plainly marked or painted on top of at least two of the thwarts, in letters and figures not less than 3 inches high. When the letters and figures above required are painted on lifeboats, such letters and figures shall be dark on a light ground or light on a dark ground. (Secs. 4405, 4488, R. S.)

LIFEBOATS AND LIFE RAFTS KEPT CLEAR FOR LAUNCHING.

36. The decks on which lifeboats of any class or life rafts are carried shall be kept clear of freight or any other obstruction that would interfere with the immediate launching of the lifeboats or life rafts. (Secs. 4405, 4488, R. S.)

BOAT-DAVIT FALLS AND RECEPTACLES THEREFOR.

37. It shall be the duty of the master or officer in charge of all vessels to see that the boat-davit falls shall at all times be in readiness for immediate use, and protected from ice, and not painted, and such boat-davit falls on all boats not swung out at boat drills shall be cast loose and overhauled; and it shall be unlawful to stow in any lifeboat articles other than those required by law and regulations. On all steamers over 1,000 gross tons, covered tubs, boxes, or reels shall be provided in which to stow away the boat-davit falls.

Where more than one lifeboat is served under one set of davits, means shall be provided that will prevent davit tackles from twisting or capsizing, and that will permit the tackles being readily rounded up for the purpose of launching the remaining lifeboats under such davits: *Provided*, That when davits are equipped with separate tackles for each boat, such nontwisting and noncapsizing device is not required. (Secs. 4405, 4488, R. S.)

CARE OF LIFEBOATS.

38. Lifeboats shall be stripped, cleaned, thoroughly overhauled, and painted at least once in every year. (Sec. 4488, R. S.)

TEST OF BOATS AT ANNUAL INSPECTION.

39. The inspectors shall satisfy themselves that every lifeboat, together with its equipment, of all vessels, is in every respect in good condition and ready for immediate use.

Every lifeboat, with its required equipment, of passenger vessels, shall be lowered to near the water and loaded to its allowed capacity, evenly distributed throughout its length, and then lowered into the water afloat. In making this test, persons or deadweight may be used. If persons are used, the weight of each person shall average at least 140 pounds. When deadweight is used, the weight shall be equivalent to at least 140 pounds for each person allowed. (Secs. 4405, 4488, R. S.)

SIZE OF BOATS.

40. No lifeboat for use on ocean steam vessels shall be of less than 180 cubic feet capacity, except that all pleasure steamers, and other steamers not exceeding 1,000 gross tons limited by their certificate of inspection to routes not exceeding 20 nautical miles offshore shall only be required to carry one lifeboat of 180 cubic feet capacity. Nothing, however, shall exempt such steamers from carrying the aggregate cubic capacity required by the rules. The minimum capacity of lifeboats for this class of vessels shall be 125 cubic feet.

The supervising inspector of the district may, in exceptional cases permit lifeboats of less than 180 cubic feet as a substitute for said boat on steamers where the crew is insufficient to properly handle a boat of that size, or where there is lack of space to properly carrry so large a lifeboat, but in every such case the steamer shall be provided with one or more lifeboats efficient in character and large enough to carry every person on board, and in no case shall the lifeboat be of less capacity than 125 cubic feet. (Sec. 4488, R. S.)

HANDLING OF THE BOATS AND RAFTS.

41. All the boats and rafts shall be stowed in such a way that they can be launched in the shortest possible time and that, even under unfavorable conditions of list and trim from the point of view of the handling of the boats and rafts, it may be possible to embark in them as large a number of persons as possible.

The arrangements shall be such that it may be possible to launch on either side of the vessel as large a number of boats and rafts as possible.

At least once in each interval of not longer than three months, the master of every inspected passenger vessel shall drill and exercise every member of the crew, except females, in pulling oars in the ship's lifeboats.

In addition, the crew of the motor-propelled boats shall demonstrate their ability in the working of the engine and handling of the boat under power.

LIFE RAFTS.

DRAWINGS, SPECIFICATIONS, NAME PLATE, AND HOW MARKED.

42. All life rafts shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the life rafts are built.

Builders of life rafts shall furnish the supervising inspector of the district in which the life rafts are built drawings, or blue prints, and specifications, showing and explaining the construction of same and showing the tensile strength and ductility of the metal used. The metal used shall have a tensile strength of not less than 40,000 pounds per square inch, and an elongation, in a length of 4 inches, of at least 20 per cent when the thickness of the metal is of, or greater than, No. 16 B. W. G., and 15 per cent when the thickness of the metal is less than No. 16 B. W. G.

Builders of life rafts shall affix a plate or other device to each life raft, having thereon the builder's name, number of raft, date of construction of raft, cubical contents of raft, and number of persons said raft will carry, as determined by the rules of the Board of Supervising Inspectors.

There shall be stenciled in a conspicuous place on each life raft now in use the number of persons said raft can carry, as hereinafter provided. (Secs. 4405, 4488, R. S.)

INSPECTION OF LIFE RAFTS WHEN BUILT.

43. Supervising inspectors of districts where life rafts are built shall detail an assistant or local inspector to any place where life rafts are being built, whose duty it shall be to carefully inspect and examine the construction of such life rafts, and he shall satisfy himself that such life rafts are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the raft he shall stamp his initials, together with the letters U. S. I., on a blank

space on the plate required to be affixed to the raft by the builder. The initials of the assistant or local inspector shall be satisfactory evidence to all parties interested that the raft has been constructed in accordance with the drawings, or blue prints, and specification on file.

This section shall apply to all life rafts constructed after June 30, 1912. (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF RAFTS OF THE CATAMARAN TYPE.

44. All metal life-raft cylinders of more than 15 feet in length or of more than 16 inches in diameter shall be constructed of metal not less than No. 18 B. W. G. No life-raft cylinders shall be of less thickness of metal than No. 20 B. W. G.

The retaining bands which secure the cylinders to the frames shall be made in halves, so that the cylinders may be detached without difficulty and without disassembling the body of the raft, for the purpose of inspection, cleaning, and painting, as required by section 46. Wooden guards and gunwales shall be secured to the retaining bands by angle-iron clips or by the jaws of the retaining bands. Iron rods extending across the raft at top and bottom shall pass through the gunwale and its securing clips or jaws at each end of the raft. The ends of the rods shall be properly secured with a screw nut inside and outside of the gunwale.

All such cylinders shall be divided by water-tight bulkheads into not less than three compartments of equal lengths. Cylinders over 9 feet in length shall be divided into equal lengths by water-tight bulkheads into not less than one compartment for every 3 feet of its length. One of such bulkheads shall be at the extreme end of each cylinder or as near thereto as the flange of cone or bumped ends will permit. Each compartment shall be provided with a suitable air-pump connection of one-half inch outside diameter, fitted with air-tight cap.

Only countersunk-headed rivets shall be used in the construction of metallic life rafts.

All seams and joints shall be properly double riveted.

The above provisions of this section shall take effect only as to life rafts constructed after December 31, 1908.

The circumferential as well as the longitudinal seams of life-raft cylinders shall be riveted and tightly calked, or securely hook jointed and efficiently soldered, or properly and securely welded on rafts constructed after June 30, 1905. Such longitudinal seams shall be secured by not less than 12 rivets to each foot, circumferential seams by not less than 10 rivets to each foot, and bulkheads by not less than 8 rivets to each foot. Bulkhead flanges may be single riveted. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The framework connecting the cylinders of metallic life rafts shall be substantially built and capable of resisting the strain which tends to break the cylinders apart when the raft is broadside on in surf or seaway. (Sec. 4488, R. S.)

TESTS OF AIR TANKS OF LIFE RAFTS.

45. Before any life raft is passed and accepted the air tanks thereof shall be tested in the presence of an inspector of this Service by an air pressure of not more than 1 pound to the square inch. At each

subsequent annual inspection, or oftener, if in the opinion of the inspectors it is necessary or desirable, the inspectors shall satisfy themselves that the tanks are in good condition, but pressure need not be applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Sec. 4488, R. S.)

CARE OF LIFE RAFTS.

46. All life rafts shall be stripped, cleaned, painted, and thoroughly overhauled at least once in every year, and inspectors shall carefully examine at all inspections the material which supports the platform of all life floats in order to determine to their satisfaction that the strength is maintained. If it is found that deterioration has begun it shall be corrected even to the extent of requiring the renewal of the platform-supporting device. (Secs. 4405, 4488, R. S.)

APPROVED LIFE RAFTS.

47. Any type of life rafts approved by the Board of Supervising Inspectors shall be considered as equivalent to the standard raft above specified. (Sec. 4488, R. S.)

CLARK LIFE RAFTS.

48. Clark life rafts shall be constructed, tested, and rated in accordance with the following specifications:

All cylinders of more than 16 inches in diameter shall be constructed of metal not less than No. 18 B. W. G., and no cylinder shall be of less thickness of metal than No. 20 B. W. G. Cylinders shall be provided with a suitable air-pump connection of one-half inch outside diameter, fitted with air-tight cap.

The inspection of life rafts shall include the testing of each compartment by air pressure.

The circumferential as well as the longitudinal seams of cylinders shall be riveted and tightly calked, or securely hook jointed and efficiently soldered, or properly and securely welded. Such longitudinal seams shall be secured by not less than 12 rivets to each foot, circumferential seams by not less than 10 rivets to each foot, and bulkheads by not less than 8 rivets to each foot.

Only countersunk-headed rivets shall be used in the construction of cylinders. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The framework connecting the cylinders shall be substantially built and capable of resisting the strain which tends to break the raft apart when the raft is broadside on in surf or when in seaway.

There shall be allowed for each person carried not less than 3 cubic feet of air space and a deck area of not less than 4 square feet.

On and after May 1, 1917, the iron or steel bolts and nuts used in the construction of Clark rafts for service on salt water shall be galvanized. Nuts shall not be countersunk in the wood frame, but shall be protected by a wooden batten properly fitted over the nuts and fayed neatly to the frame. (Sec. 4488, R. S.)

USE OF BARSTOW LIFE RAFT PROHIBITED.

49. The use of the Barstow life raft is prohibited on vessels on any waters after February 28, 1914. (Sec. 4488, R. S.)

CAPACITY AND ALLOWANCE OF LIFE RAFTS.

50. No type of raft may be approved unless it satisfies the following conditions:

First. It should be reversible and fitted with bulwarks of wood, canvas, or other suitable material on both sides. These bulwarks may be collapsible and shall be not less than 4 inches high.

Second. It should be of such size, strength, and weight that it can be handled without mechanical appliances, and, if necessary, be thrown from the vessel's deck.

Third. It should have not less than 3 cubic feet of air cases or equivalent buoyancy for each person whom it can accommodate.

Fourth. It should have a deck area of not less than 4 square feet for each person whom it can accommodate, and the platform should be not less than 6 inches above the water level when the raft is loaded.

Fifth. The air tanks or equivalent buoyancy should be placed as near as possible to the sides of the raft.

Rafts shall never be allowed a greater number of persons than for which there is proper seating capacity without interfering with the use of the oars. At least one-half of the number of life rafts on all steam vessels shall each have a capacity exceeding 15 persons.

Tule and all other types of life rafts shall meet the requirements herein specified. (Sec. 4488, R. S.)

HANDLING OF THE RAFTS.

51. All rafts shall be stowed in such a way that they can be launched in the shortest possible time and that, even under unfavorable conditions of list and trim from the point of view of the handling of the rafts, it may be possible to embark in them as large a number of persons as possible.

The arrangements shall be such that it may be possible to launch on either side of the vessel as large a number of rafts as possible.

EQUIPMENT FOR LIFE RAFTS.

52. All life rafts on ocean steam vessels shall be equipped as follows:

A properly secured life line entirely around the sides and ends of the raft, festooned to the gunwales in bights not longer than 3 feet with a seine float in each bight.

One painter of manila rope of 2¾ inches in circumference, and of suitable length.

Four oars.

Five rowlocks properly attached.

One boat hook attached to a staff of suitable length.

One self-igniting life-buoy light.

One sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so constructed that the oil can be easily distributed on the water, and so arranged that it can be attached to the sea anchor.

A water-tight receptacle containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread or United States Army ration. The receptacle shall be of metal and fitted with an opening in the top not less than 5 inches in diameter, properly protected by a screw cap made of heavy cast brass, with machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

A water-tight receptacle containing 1 quart of water for each person.

Two enameled drinking cups.

A water-tight metal case containing six self-igniting red lights capable of burning at least two minutes.

A water-tight box of matches.

All loose equipment shall be securely attached to the raft to which it belongs. (Sec. 4488, R. S.)

CERTIFICATED LIFEBOAT MEN—MANNING OF THE BOATS.

53. There shall be for each boat or raft a number of lifeboat men at least equal to that specified as follows: If the boat or raft carries 25 persons or less, the minimum number of certificated lifeboat men shall be 1; if the boat or raft carries 26 persons and less than 41 persons, the minimum number of certificated lifeboat men shall be 2; if the boat or raft carries 41 persons and less than 61 persons, the minimum number of certificated lifeboat men shall be 3; if the boat or raft carries from 61 to 85 persons, the minimum number of certificated lifeboat men shall be 4; if the boat or raft carries from 86 to 110 persons, the minimum number of certificated lifeboat men shall be 5; if the boat or raft carries from 111 to 160 persons, the minimum number of certificated lifeboat men shall be 6; if the boat or raft carries from 161 to 210 persons, the minimum number of certificated lifeboat men shall be 7; and, thereafter, 1 additional certificated lifeboat man for each additional 50 persons: *Provided*, That if the raft carries 15 persons or less a licensed officer or able seaman need not be placed in charge of such raft: *Provided further*, That one-half the number of rafts carried shall have a capacity of exceeding 15 persons.

The allocation of the certificated lifeboat men to each boat and raft remains within the discretion of the master, according to the circumstances.

By "certificated lifeboat man" is meant any member of the crew who holds a certificate of efficiency issued under the authority of the Secretary of Commerce.

In order to obtain the special lifeboat man's certificate the applicant shall prove to the satisfaction of an officer designated by the Secretary of Commerce that he has been trained in all the operations connected with launching lifeboats and the use of oars; that he is acquainted with the practical handling of the boats themselves; and, further, that he is capable of understanding and answering the orders relative to lifeboat service.

MANNING OF BOATS.

54. A licensed officer or able seaman shall be placed in charge of each boat or pontoon raft; he shall have a list of its lifeboat men and other members of its crew which shall be sufficient for her safe management, and shall see that the men placed under his orders are acquainted with their several duties and stations.

A man capable of working the motor shall be assigned to each motor boat.

The duty of seeing that the boats, pontoon rafts, and other life-saving appliances are at all times ready for use shall be assigned to one or more officers.

LIFE PRESERVERS.

55. Every vessel inspected under the provisions of Title LII, Revised Statutes of the United States, shall be provided with one good life preserver, having the approval of the Board of Supervising Inspectors, for each and every person carried, and every vessel carrying passengers shall have in addition thereto a number of life preservers suitable for children equal to at least 10 per cent of the total number of persons carried.

Every life preserver adjustable to the body of an adult person, manufactured after February 10, 1923, shall be of the reversible type, made of suitable material approved by the Board of Supervising Inspectors, with straps properly attached on each side of the body of the life preserver (thus making it reversible), with recesses under the arms, thereby allowing the front and back sections to fit around the upper part of the wearer, and held in place by the straps, and the upper part of the life preserver shall be made vest-like, the whole so constructed as to place the main buoyant body of the device underneath the shoulders and around the body in a manner that it will support the person wearing it in an upright or a slightly backward position.

All such life preservers shall be not less than 52 inches in length when measured laid flat, and every life preserver shall be capable of sustaining for a continuous period of at least 24 hours an attached weight so arranged that whether the said weight be submerged or not there shall be a direct downward gravitation pull upon said life preserver of at least 20 pounds.

All life preservers shall be covered with uncolored material without filling or sizing, of sufficient weight and strength to fully protect the contents, such material to be unbleached cotton drill or twill of not less than 6 ounces in weight to a section of 30 by 36 inches. Such covering on the body of each life preserver shall be of one piece only, and the outside longitudinal edge of the covering seam shall be turned to a roll and closely rope stitched: *Provided*, That the material used in construction of the vestlike top may be made of separate pieces of like material of the same weight, gored to fit, and securely sewed by a double row of stitching to top of such life preserver: *Provided further*, That vivatex may be used as a cover for life preservers when such material is of a weight not less than 10.2 ounces per square yard.

The straps or other approved means of securing the life preserver about the body of the wearer shall be of double-woven cotton tape of 1¼ inches width with two selvage or cord edges, of 175 pounds tensile strength, extending along both sides of the life preserver and secured thereto in a permanent manner, so as to make such life preserver reversible, the ends of the straps extending 12 inches beyond the ends of the jacket: *Provided*, That when it becomes necessary to replace belt straps on life preservers of the single-belt type, it shall be done in the foregoing manner, so as to make such repaired life preservers reversible.

All thread used in the construction of life preservers shall be of a size and strength not less than Barbour's linen, three-cord, No. 25, machine thread, and any thread other than linen shall be approved by the Board of Supervising Inspectors before being permitted to be used. All seams and other machine sewing on life preservers shall be with a short lock stitch, not less than eight stitches to the inch.

Cork block life preservers shall contain an aggregate weight of 5½ pounds of good cork in the body thereof, and where the blocks are made up of separate pieces said pieces shall be fastened with noncorrosive materials.

Blocks of compressed cork when used in life preservers shall weigh in the aggregate not less than 5½ pounds in the body thereof, and shall be so constructed that said blocks will sustain, without disintegration or substantial expansion, a submersion test satisfactory to the inspector examining the same, and that at the expiration of such test shall have the buoyancy above required.

Blocks of balsa wood or sheaves of tule when used in life preservers shall fulfill the same requirements as for life preservers constructed of solid or compressed cork as to construction, material in cover, straps, and thread, and be subjected to similar tests for buoyancy.

The edges, corners, and outside surface of block material used in the construction of life preservers shall present a smooth surface to guard against undue destruction of the covering material and present suitable smooth surface for legible stenciling and stamping by the inspectors making the inspection.

When a kapok collar is provided, it shall be filled with prime Java kapok, efficiently tufted, such collar filling to weigh at least 10 ounces, and every such kapok collar shall be capable of sustaining for a continuous period of at least 48 hours an attached weight so arranged that whether the weight shall be submerged or not there shall be a direct downward gravitation pull of at least eleven times the weight of the completed collar or collar sample undergoing the test. Such kapok supporting collars and all other supporting collars shall be subjected to buoyancy test separate and independent to that of the test required for the body of the life preserver.

Every new type of life preserver submitted to the Board of Supervising Inspectors for approval shall be accompanied by specifications, blue prints, or drawings, in triplicate, and no such type of life preserver shall be approved without an actual satisfactory service test being witnessed by the Board of Supervising Inspectors.

All life preservers shall be marked with the name and address of the manufacturer.

After September 2, 1921, no life preserver shall be passed at the factory inspection which does not fulfill the foregoing requirements, but life preservers now in use or already passed at factory inspection may be used on board vessels, provided they are constructed in accordance with the laws and regulations in force up to the date of September 2, 1921, and are in good and serviceable condition: *Provided*, That life preservers that have deteriorated to the extent of requiring new covers may be used upon vessels under the jurisdiction of this service when reconstructed in a manner to conform in every particular with the foregoing requirements.

Inspectors are required to direct such life preservers to be distributed throughout the cabins, staterooms, berths, and other places convenient for passengers on such steamers, and there shall be a *printed notice* posted in every cabin and stateroom and in conspicuous places about the deck informing passengers of the location of life preservers and of the mode of applying or adjusting the same. Life preservers on passenger, excursion, and ferry steamers when stowed overhead shall be so supported that they can be quickly released and distributed among the passengers, and the inspector shall satisfy himself as to the efficiency of the means used for such purpose by actual experiment; and when such life preservers are stowed overhead at a height greater than 7 feet from the deck below efficient means shall be provided for such immediate release and distribution to be operated by persons standing on the deck below.

The supervising inspector of the district shall detail a local or assistant inspector to any place where life preservers are manufactured, whose duty it shall be to test and examine all life preservers manufactured at that place and satisfy himself that such life preservers are in accordance with the requirements of the Board of Supervising Inspectors. When found to be in accordance with the requirements, the inspector shall stamp them with a stamp bearing the initials of his name and the date of examination and certifying that they have been examined and passed. When life preservers are so stamped, it shall be prima facie evidence that they comply with the requirements of law and regulations as to their original construction, and they may thereafter be accepted by inspectors, in their discretion, as being in accordance with the rules and regulations of the Board of Supervising Inspectors. Any life preserver of a type that has been approved by the Board of Supervising Inspectors subsequent to 1922 may be examined and passed as provided for by this paragraph after the same has had the approval of the supervising inspector of the district in which it is manufactured, and every manufacturer of such life preservers shall furnish 12 sets of blue prints or drawings and specifications to the said supervising inspector, one of which shall be forwarded to the bureau, and one to each supervising inspector.

At each annual inspection of any vessel, and oftener if deemed necessary, it shall be the duty of the inspectors making the inspection to examine and inspect all life preservers in the equipment of such vessel and satisfy themselves (or himself) that such life preservers are in accordance with the requirements of the Board of Supervising Inspectors: *Provided*, That when any block of compressed cork used in a compressed-cork type life preserver is found to be in a broken or granulated condition, such compressed-cork block shall be condemned as unfit for further use. When found to be in accordance with the requirements, the inspector shall plainly stamp them with a stamp bearing the word "Passed," his initials, the inspector's port, and the date of approval: *Provided*, That at the annual inspection of a vessel, or oftener if necessary, at least 5 per cent of all *kapok life preservers*, or such greater number as may be deemed necessary or desirable, shall be subjected to a buoyancy test, as follows: Life preserver containing kapok as buoyant material in the body thereof, if for the use of adults, shall be subjected to a test for buoyancy by being entirely submerged for a period of two hours, after which it shall be capable of sustaining in water an attached weight having an actual downward gravitation pull of 20 pounds when the weight is submerged, and kapok life preservers with kapok collars shall be subjected to a similar test, except that the attached weight shall have an actual downward gravitation pull of 28 pounds when the weight is submerged. The test for children's life preserver shall be the same as the test for adults' life preserver except the final test for buoyancy, which shall be by a submerged weight of 10 pounds for life preservers without collar and 14 pounds for life preserver with collar. Any such life preserver failing to meet the required test shall be immediately condemned and removed from the vessel's equipment, and a full detailed report of every such failure shall be immediately forwarded to the supervising inspector of the district having jurisdiction.

Inspectors inspecting *Government vessels* upon request of any department of the Government may accept life preservers made under the specifications of any department of the Government, and stamp same with the inspector's stamp and an additional stamp bearing the legend "U. S." within a circle for identification, with the understanding that they are not to be used except upon Government vessels and will not be allowed as any part of the equipment of vessels under the jurisdiction of this service.

Every life preserver for the use of *children* shall be made of suitable material approved by the Board of Supervising Inspectors, capable of sustaining in water a weight of 10 pounds for a period of 24 hours, and of the same general form of construction as to material and design as required for an adult's life preserver.

Each life preserver shall be marked on the front compartment "Adults," if for the use of adults; and "Children," if for the use of children; and if of a character suitable for the use of both adults and children, it shall be so marked.

Life preservers which depend upon *inflation or air compartments* for buoyancy, or which are constructed of *loose granulated material* or any other material not approved by the Board of Supervising Inspectors, shall not be allowed. Any life preserver hereafter approved by the Board of Supervising Inspectors may be accepted in lieu of those specified in this section.

KAPOK LIFE PRESERVERS.

Every type of kapok life preserver used on any vessel subject to inspection by this service shall first be approved by the Board of Supervising Inspectors. The life preservers receiving such approval shall conform in every respect to the sample submitted to the board.

Kapok life preservers to receive the approval of the board shall be simple in design and of a character to support the wearer in an upright or slightly backward position. The life preserver shall be filled with not less than 1½ pounds of prime Java kapok and shall be suitably and efficiently tufted. It shall be tested for buoyancy as follows:

First. At least 1 life preserver from each lot of 250 shall be selected indiscriminately by an inspector of this service for buoyancy test.

Second. The life preserver shall be submerged in a tank of fresh water for a period of 48 hours.

Third. The life preserver shall then support in fresh water a submerged weight of 20 pounds for a period of 24 hours. Whenever life preservers contain more than 1½ pounds of kapok in the body thereof the buoyant test shall be made in the ratio of 20 pounds to each 1½ pounds of kapok.

When a kapok collar is provided, it shall be filled with prime Java kapok, efficiently tufted, such collar filling to weigh at least 10 ounces, and every such kapok collar shall be capable of sustaining for a continuous period of at least 48 hours an attached weight so arranged that whether the weight shall be submerged or not there shall be a direct downward gravitation pull of at least 11 times the weight of the completed collar or collar sample undergoing the test. Such kapok supporting collars and all other supporting collars shall be subjected to a buoyancy test separate and independent to that of the test required for the body of the life preserver.

All approved kapok life preservers shall be marked with the name and address of the manufacturer. Each life preserver shall be marked on the front compartment "Adults," if for the use of adults; and "Children," if for the use of children; and if of a character suitable for the use of both adults and children, it shall be so marked.

For each lot of 250 life preservers the manufacturer shall submit to the local inspectors of the district in which maufactured an affidavit setting forth the material with which the life preservers are filled and that the life preservers meet in every respect the requirements of the General Rules and Regulations of the Board of Supervising Inspectors. Every life preserver meeting the above requirements shall be inspected by an inspector of this Service and stamped with his initials and the date of inspection. (Sec. 4488, R. S.)

RING LIFE BUOYS.

56. The minimum number of life buoys with which vessels are to be provided is fixed as follows:

Vessels under 100 feet in length, minimum number of buoys, 2; vessels 100 feet and less than 200 feet in length, minimum number of buoys, 4, of which 2 shall be luminous; vessels 200 feet and less than 300 feet in length, minimum number of buoys, 6, of which 2 shall be luminous; vessels 300 feet and less than 400 feet in length, minimum number of buoys, 12, of which 4 shall be luminous; vessels 400 feet and less than 600 feet in length, minimum number of buoys, 18, of which 9 shall be luminous; vessels 600 feet and less than 800 feet in length, minimum number of buoys, 24, of which 12 shall be luminous; vessels 800 feet and over in length, minimum number of buoys, 30, of which 15 shall be luminous.

Ring life buoys shall be of solid cork or any other equivalent material, shall be of not less than 30 inches outside diameter and not less than 17 inches inside diameter, and shall be capable of sustaining in fresh water for a continuous period of 24 hours an attached weight so arranged that, whether said weight be submerged or not, there shall be a direct downward gravitation pull upon the buoy of not less than 31 pounds. The body of the buoy before being covered shall stand a downward gravity pull of 200 pounds, the weight to be attached to the buoy body by a sling covering a surface of 2 linear inches, without breaking, without rupture of the joints, or without showing a maximum elongation of internal diameter in excess of 1½ inches while the weight is attached after being under this test for a period of 30 minutes.

The buoy shall be covered with cloth of sufficient weight and strength to fully protect the body of the buoy. Such material shall be of a strength equivalent to an unbleached single-filling cotton duck having a weight of 8 ounces to a section 36 by 36 inches.

The cover shall be constructed and placed on the body of the buoy in a substantial manner. All seams and other machine sewing on the buoy shall be with a short lock stitch not less than eight stitches to the inch. The inside seam shall be sewed with a rope stitch not less than three stitches to the inch.

Four beckets 2½ inches wide, made from the same material as the covering of the buoy, shall be securely attached to the buoy and spaced an equal distance from each other. A line shall pass through the beckets, which shall be sewed tightly together to prevent slipping. The line shall be manila, three-eighths inch in diameter, three-ply medium lay, of good quality, having the ends securely and neatly spliced, the line to be festooned in bights around the outer edge of the buoy. All thread used in the construction of the buoy shall be No. 16, three-cord linen.

When the buoy is made of cork, the cork form shall be constructed of sound, buoyant corkwood, in two layers or thicknesses. The cork sheets shall be flattened and smoothed so that the back or outside hard crust is removed sufficiently to give a smooth surface for gluing. One layer shall be built of segments not to exceed four in number. The other layer may be built of segments not to exceed eight in number. The ends of all segments shall be fitted neatly and glued securely one to the other. The two layers shall be neatly joined and properly and securely dowel-pinned and glued firmly together, with joints staggered or broken. The glue used shall be insoluble in water, and the finished buoy shall stand steaming at a pressure of 2 pounds for a period of 30 minutes without disintegration or other positive indications of the glue losing its adhesive properties. When completed, the outside of the buoy shall be of good, sound corkwood finished to a smooth surface. Any form of construction which will meet the general purposes of the above specifications and requirements may be used after having been approved by the Board of Supervising Inspectors.

The supervising inspector of the district shall detail a local or assistant inspector to any place where cork ring life buoys are manufactured within his district, whose duty it shall be to test and examine all such buoys manufactured at that place. When a cork ring life buoy is found to be in accordance with the requirements of the rules of the Board of Supervising Inspectors, the inspector shall stamp the cork, and, after completion of the buoy, shall stamp the cover with the word "Passed," his initials, the inspection port, and the date of approval. The cork and the cover shall also be stamped by the manufacturer with the name or trade-mark of the manufacturer.

Balsa-wood A B C ring life buoys shall be constructed of good, fresh, sound balsa wood and shall be made in two layers with not more than four pieces in each layer, the same to be properly and securely dowel-pinned, and shall be of not less than 30 inches outside diameter and not less than 17 inches inside diameter, and of sufficient buoyancy to sustain the specified weight and give the buoyancy required, and shall be covered with the same weight canvas, stitched, roped, and marked or stamped as required by the specifications for cork ring life buoys.

The use of kapok, rushes, cork shavings, granulated cork, or an other loose granulated material, or compartments which depend o inflation for their buoyancy, is not allowed in the manufacture o ring life buoys.

Ring life buoys shall not be permanently secured in any way, bu shall be so placed as to be readily accessible in an emergency. Thei location shall be plainly indicated.

One of the buoys on each side of the vessel shall have a life lin attached of at least 15 fathoms in length.

Luminous buoys are those having attached an efficient self-ignitin light which can not be extinguished in water.

SELF-IGNITING WATER LIGHTS.

57. The self-igniting water lights for ring buoys and life rafts sha consist of a cylinder (with bumped heads or ends) made of goo sheet copper of not less than 0.022 inch thick, and shall be so designed as to be nonexplosive, and shall be free from any defects whic may affect the serviceability or operation of the light. The cylinde shall be sufficiently weighted in the bottom to recover and maintai an upright position in the water, and all circumferential and horizontal seams of the cylinder shall be hook jointed and soldered, an the top circumferential seam shall be flush, so as to prevent th lodgment of water.

The cylinder shall be provided with a plug or other device of suc character that when removed from the cylinder sufficient water wi be admitted to insure the prompt and efficient action of the ligh regardless of whether the cylinder when first striking the wate becomes completely submerged.

The removal of the plug or device shall be effected by the operation of a lanyard attached to the buoy and to the plug or device o the cylinder, and shall be so arranged and constructed that th weight of the buoy when thrown overboard will automatically disengage the plug or device, and will insure that the light will self-ignite within one minute after reaching the surface of the wate *Provided*, That on oil-tank steamers the self-igniting water light nee not be attached to the ring buoy, but may be placed alongside th buoy which it is intended to serve, so that it can be easily and quickl attached to the buoy by means of its lanyard when needed in case o emergency.

On oil-tank steamers, when self-igniting water lights are no attached to the ring buoys, a snap hook shall be provided for thi purpose.

The cylinder shall contain calcium carbide (taken from fresh stoc entirely free from the white powdery substance resulting from exposure to the air) and calcium phosphide sufficient to create a brilliant flame of at least 150 candlepower, which shall be maintaine and burn for a continuous period of not less than 45 minutes withou emitting obnoxious fumes. If at any time during this period th flame is extinguished, due to the total submersion of the light, th light shall self-ignite upon coming to the surface.

The self-igniting water lights required for life rafts shall meet th above requirements, except that the plug or device may be remove by manual action instead of by automatic action of the buoy lanyard above referred to.

The cylinder shall be plainly marked with the word "Top" at its top end and permanently indented or embossed with the name and address of the manufacturer, the year of manufacture (the use of labels of any description for this purpose is strictly forbidden), and with the statement that the device meets in every way the requirements of the Board of Supervising Inspectors.

On and after July 1, 1924, no type or make of water light will be approved which has not been tested by the Bureau of Standards, Department of Commerce, and found to conform in all respects to these requirements.

These rules for water lights shall be effective on and after July 1, 1924. *Provided*, That water lights manufactured before April 1, 1924, and installed on vessels previous to the application of the present requirements will be allowed to remain in service so long as they are maintained in good and serviceable condition; and inspectors, when inspecting vessels having such water light equipment, shall give especial attention to the condition of the water lights, and if there appears any evidence whatsoever of corrosion, such as blisters and warts under the paint, or where the can is badly abraised by hard usage or carelessness, the same shall be condemned at once and new water lights of an approved type substituted for the ones so condemned, and the attention of the officers of the vessel shall then be called to the necessity for greater care to be exercised in the preservation of the equipment, and it shall be made clear to them that they will be held strictly accountable to this service for the condition of the same.

FLASH LIGHTS AND BATTERIES FOR LIFEBOATS.

58. The flash lights for lifeboats shall be of all metal, rugged construction, of focusing type with a reflector head of about 2 inches in diameter. The reflector shall have a true parabolic surface, coated with a heavy silver polished plate, free from mars and dents, and protected by a coat of clear lacquer. The flash light shall be provided with two extra lamps, and all external parts of the flash light shall be protected by a heavy nickel plating or a black baked-on lacquer or enamel.

The flash-light batteries shall be of the sal ammoniac type with depolarizer. They shall have a nonspillable electrolyte and be free from leakage during the useful life of the cell. They shall be of the tubular construction, comprising three cells assembled in line, end to end in a suitable close fitting tube or jacket of news, chip or strawboard. The brass cap on the carbon rod and the zinc bottom of the cell shall serve as the terminals. The batteries shall be marked with the "trade name of the cell, the name of the manufacturer or trademark number, or other designations of size, the date of manufacture and the date of expiration of a guarantee period for *U. S. Marine Service.*" Local or assistant inspectors making annual inspections or reinspections shall satisfy themselves that such flash-light equipments are in condition to warrant the belief that same are efficient for emergency use between the date of such inspection and the next following inspection or reinspection date. The batteries, however, shall not be continued in use for lifeboat equipment for a period exceeding one year from the date of manufacture.

The flash-light batteries allowed under this specification shall b of a quality to meet the United States Bureau of Standards tests a to voltage, capacity, delayed service tests, and required performanc (Secs. 4405, 4417, 4491, R. S.)

DISTRESS LIGHTS.

59. Distress lights required to be used in lifeboat and life raf equipment shall have a burning capacity of not less than two minute and to give forth a brilliant red flame of not less than 500 candlepowe signals to be treated and made impervious to moisture, the container to be constructed of 18-ounce or No. 22 B. W. G. copper o equal noncorrosive metal, lock jointed and soldered, bottom to b rolled in and soldered, cover or top to be made of cast brass not les than one-eighth of an inch thick and 5 inches in diameter, to fi down on rubber gasket to make container water-tight. The cove shall be so constructed as to be easily removed: *Provided*, That container of the same material and construction, with a cover of no less than 3 inches in diameter, may be used on life rafts.

LINE-CARRYING GUNS AND EQUIPMENT.

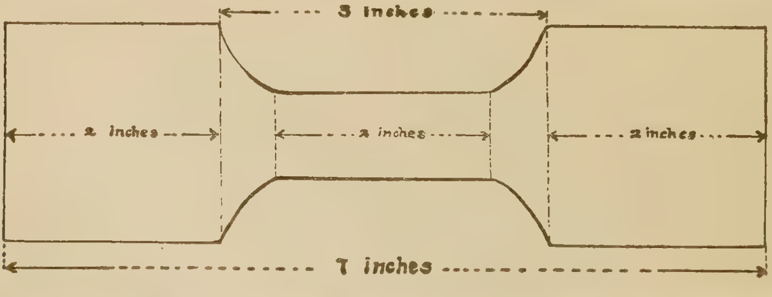
60. All steam vessels of 150 gross tons and over navigating th ocean shall be equipped with at least three line-carrying projectile and the means of propelling them, of a type and character whic have been officially approved by the Board of Supervising Inspector (Sec. 4488, R. S.)

ALLOY OF LYLE-TYPE GUNS.

61. The material entering into the construction of cast-bronz guns for use on board steam vessels as a means of propelling line-carrying projectiles shall have a tensile strength of not less tha 52,000 pounds per square inch of section and a reduction of area c not less than 25 per cent. (Sec. 4488, R. S.)

SAMPLE OF GUN FOR TESTING.

62. At least one sample of the material shall be taken from th casting of each gun, and shall be not less than 7 inches in lengt 2 inches in width, one-half inch in thickness, and have a section 0. by 0.75 inch over a length of 2 inches, according to the followin diagram:



The samples for testing shall be furnished the supervising inspect of the district where the gun is to be tested and shall be accompanie by an affidavit of the manufacturer of the gun that the sampl actually and correctly represent the material of the gun. Th samples shall be distinctly marked with the same number appearing on guns which they represent, so as to be readily identified by the inspector.

FIRING TEST OF LYLE AND HUNT GUNS.

63. All line-carrying guns of the cannon type shall be tested in the presence of an inspector by firing three rounds from the gun. One round at least shall carry the regular service projectile, with a service line attached, a distance of at least 1,400 feet without breaking or fouling the line, the performance to be based upon the conditions of a reasonably still atmosphere. The other rounds shall be fired with not less than the same weight of powder charge, one of which shall be not less than a weight of 8 ounces, and with projectiles of the same weight as the service projectile, but no line need be attached: *Provided*, That the distance requirement for the Hunt line-carrying gun, small, shall be only 800 feet.

The primer hole fitted in the upper wall of all guns of the cannon type manufactured after June 30, 1920, shall be protected by a beading, coaming, or projection extending above the wall of the gun not less than one-half inch.

The test rounds required shall be fired from the gun when mounted on its own carriage, lashed as it would be in shipboard use, and when this test is completed, the gun and its mounting shall show no signs of fracture or damage.

The line shall be coiled, faked, or reeled in its own faking box or reel in such manner that when all the line leaves the container it shall automatically become unattached and free from the container. The end of the line intended to be attached to the projectile shall have securely attached thereto a substantial tag bearing a permanent legend which shall indicate its purpose, and the other end of the line shall be tagged in the same manner in order that there may be no delay in securing proper and immediate action of the equipment, and the gun, carriage, line box or reel, and projectiles shall all bear the same number and shall be initialed by the inspector, whose report of the test, giving number, date, and result, shall be filed in the office of the supervising inspector of the district in which the test is made. (Sec. 4488, R. S.)

STEEL GUNS.

64. Before any steel gun of the cannon type shall be approved the manufacturer shall furnish the supervising inspector of the district where the gun is tested a sample of the material of which it is constructed, such sample to be of the following dimensions: Seven inches in length and approximately 1½ inches wide and 1 inch thick, with a section 2½ inches in the center turned down to ½ inch diameter, the sample to be accompanied by the same form of affidavit as required for bronze guns. The sample shall show a tensile strength of not less than 65,000 pounds per square inch of section and an elongation of not less than 20 per cent in a length of 2½ inches. (Sec. 4488, R. S.)

AUXILIARY LINES AND PROJECTILES.

65. All steamers required under the law to carry line-carrying projectiles and the means of propelling them shall be supplied auxiliary thereto with at least 800 feet of 3-inch manila line for vessels

of over 150 and not over 500 gross tons, and 1,500 feet of such lin for steamers over 500 gross tons, and with three approved servi lines and three projectiles. The auxiliary line and all other equi ment shall be kept always easily and immediately accessible an ready for use in connection with the gun and shall not be used f any other purpose. (Sec. 4488, R. S.)

SHOULDER GUN.

66. The gun known as the "shoulder gun" may be used on steamer of 300 tons and under as a means of propelling a line-carrying pr jectile. This gun is an ordinary breech-loading rifle with barr shortened and bore smoothed, using a blank cartridge of 45–70 50–70, propelling a projectile about 8 inches long, weighing abou 8 ounces, attached to a line not less than 400 feet in length.

The projectile shall be thrown a distance of not less than 250 fee without fouling or breaking the line. The gun shall be of a typ approved by the Steamboat-Inspection Service. The manufac turer of the gun shall furnish purchasers with an affidavit that it of approved type, of safe material, and good workmanship. Eac shoulder gun shall be provided with three shot lines, 10 projectile at least 25 cartridges, and the other necessary equipment. Eac vessel using the shoulder gun shall carry auxiliary thereto, to b used for no other purpose, at least 500 feet of 3-inch manila lin (Sec. 4488, R. S.)

SERVICE PROJECTILE LINES AND PROJECTILES.

67. Service projectile lines shall approximate in size the line use by the United States Coast Guard and shall be not less than 1,70 feet in length, made in one continuous length without splice, kno or other retarding feature, and shall be capable of withstanding breaking strain of 500 pounds.

The purchaser of service lines shall be furnished a statement b the dealer or manufacturer that, based upon the test of a sampl from each end of the line, it is of the required strength and that th line has been examined over its entire length and found to be withou splice, knot, or other defective feature. A copy of such statemen shall be furnished by the purchaser or dealer to the supervisin inspector of the district in which the gun and line are tested.

The container of the line shall bear the name of the manufacturer dealer, together with the statement that the line in all respects mee the requirements of the Steamboat-Inspection Service, and inspecto making annual inspections or reinspections shall fully satisfy the selves that such equipment meets all requirements in every respect.

The projectiles shall weigh not less than 18 pounds, be smooth turned and finished, with a windage of not more than one sixt fourth of an inch. No such projectile or means of propelling it sha hereafter be approved unless of such a character that the projecti and propelling charge can be readily withdrawn from the gun whe it becomes necessary or desirable to do so. Powder containers center-fire type shall be of such construction that proper alignme of firing pin and percussion primer always obtains when propelli charge and projectile are set for use. When perforated metal powd containers are used, such perforations shall extend entirely aroun the base of such containers, and at least 25 efficient primers sha be carried for the firing thereof.

It is recommended that the charge of powder in actual service on shipboard shall be from 5 to 6 ounces, but may be exceeded under extraordinary circumstances, and in no case shall the charge exceed 8 ounces. The end of the line attached to the projectile should be thoroughly wet for a length of about 1 fathom. (Sec. 4488, R. S.)

REPORT OF TEST OF GUN.

68. The supervising inspector shall furnish the manufacturer of any line-carrying gun a copy of the report on each gun tested and inspected. (Sec. 4405, R. S.)

DRILL REQUIRED WITH LINE-CARRYING GUNS.

69. The master of every vessel equipped with a line-carrying gun shall drill his crew in the use thereof and fire said gun at least once in every three months, using one-half the usual charge of powder and any ordinary line of proper length.

It shall be the duty of the inspectors at the annual inspection to see that these drills are entered on the log of the vessels. (Sec. 4405, R. S.)

PLACARD CONTAINING INSTRUCTIONS FOR USE OF GUN APPARATUS.

70. A placard containing instructions for using the gun apparatus required by the foregoing section and as practiced by the United States Coast Guard shall be posted in the pilot house, engine room, and in the seamen's, firemen's, and steward's department of every steam vessel required by law to carry such gun apparatus. (Sec. 4405, R. S.)

EXTRA STEERING APPARATUS, LADDERS, STAIRWAYS.

71. Extra steering apparatus consisting of relieving tackles or tiller shall be provided for all steamers: *Provided, however*, That where a steamer is equipped with auxiliary steam or hand steering gear attached to rudder entirely independent of the regular steering gear same may be used in lieu of the relieving tackles or tiller required.

Every steamer or barge carrying passengers shall be provided with suitable ladders to enable passengers to descend conveniently to the lifeboats and life rafts. One of such ladders shall be provided for each set of boat davits and kept ready and convenient for use on the boat deck and shall be long enough to reach from such deck to the vessel's seagoing light water line. All such ladders shall be reversible and free from projections in order that the garments of descending or ascending persons will not become entangled in them.

Every steam vessel shall be provided with sufficient means of escape from the lower to the upper deck, or vice versa, and every steamer of 50 tons or over carrying passengers shall be provided with permanent stairways forward and aft, except where said stairways on towing boats would interfere with towing bitts. (Secs. 4405, 4480, 4484, R. S.)

BULKHEADS.

72. Every seagoing steam vessel constructed after July 1, 1912, carrying passengers shall have a water-tight collision bulkhead. In vessels not over 200 feet in length this bulkhead shall be located about

one-tenth the vessel's length from stem. In vessels over 200 a
not over 350 feet in length the collision bulkhead shall be located abo
one-twelfth the vessel's length abaft the stem. In vessels over 3
and not over 500 feet in length it shall be located about one-fifteen
the vessel's length abaft the stem, and in vessels over 500 feet
length about one-sixteenth the vessel's length abaft the stem. Su
vessels shall also have one water-tight bulkhead forward of and o
abaft the engine and boilers, and in addition thereto shall have su
other water-tight bulkheads as may be necessary to provide that the
shall be no space between the bulkheads to exceed in length one-fif
the length of the vessel: *Provided, however*, That in no case shall t
distance between the bulkheads be greater than 80 feet.

Screw steamers shall, in addition to the above-named bulkhead
have located at a suitable distance forward from sternpost a wate
tight bulkhead to protect vessel from disaster in case of fracture
stern pipe.

Sailing vessels of over 700 tons carrying passengers for hire sh
have a water-tight collision bulkhead. Such collision bulkhead sh
be placed not less than 5 feet from the stem of the vessel.

Wooden steamers carrying passengers whose cargo is restricted
lumber exclusively shall only be required to have a water-tight co
lision bulkhead as described in the first paragraph of this sectio
also one water-tight bulkhead forward of and one abaft the engin
and boilers.

All such bulkheads shall be of iron or steel plates not less than on
fourth inch thick and shall be securely fastened to suitable fram
work, which framework shall be properly and securely attached
the hull. Such bulkheads shall be strengthened by vertical bars
not less than 3½ by 3½ inch angle iron, spaced not more than 30 inch
from center to center, and all steamers that are more than 10 fe
deep in any hold shall have horizontal angle irons of not less tha
3 by 3 inches on the reverse side, spaced not more than 4 feet fro
center to center, in addition to the vertical angle irons: *Provide*
That when any bulkheads are constructed of equal strength to t
above-described bulkheads, they shall be allowed by the local i
spectors.

All bulkheads shall reach to the main deck in single-decked vesse
otherwise to the deck next below the main deck, but in every ca
they shall reach to the deck next above the deep-load line. (Se
4490, R. S.)

MEANS OF ESCAPE FROM STEAMERS.

73. On all steamers where the plans and arrangements will po
sibly permit, all inclosures where passengers or crews may be qua
tered, or where anyone may be employed, shall be provided with n
less than two avenues of escape, so located that if one of such avenu
is not available another may be. The locality and arrangement
such additional means of escape shall be determined by the steambo
inspectors and the steamboat managers as will in their judgment be
carry out the purposes for which this provision was made. (Se
4417, R. S.)

STORM OIL.

74. On and after January 1, 1915, ocean vessels of more than 2
gross tons propelled by machinery and navigating the oceans

gulfs shall carry a supply of oil for the purpose of smoothing the sea or quelling the force of the waves in case of emergency or necessity in the following quantities:

Vessels of over 200 and not over 1,000 gross tons, 30 gallons.
Vessels of over 1,000 and not over 3,000 gross tons, 40 gallons.
Vessels of over 3,000 and not over 5,000 gross tons, 50 gallons.
Vessels of over 5,000 gross tons shall carry at least 100 gallons.

This oil shall be accessible and available at all times, and the location of the supply and the means and methods of its distribution shall be determined by the master of the vessel. (Secs. 4405, 4417, R. S.)

STEAMER'S NAME ON EQUIPMENTS.

75. All the equipments of a steamer, such as buckets, hose, axes, boats, oars, rafts, life preservers, floats, barrels, and tanks, shall be painted or branded with the name of the steamer upon which they are used. (Sec. 4405, R. S.)

COASTWISE.

Rule III.—Boats, Rafts, Bulkheads, and Life-Saving Appliances.

COASTWISE STEAMERS.

1. Under this designation shall be included all steam vessels navigating the waters of any ocean or the Gulf of Mexico 20 nautical miles or less offshore.

For the purpose of apportioning lifeboat and life-raft equipment upon coastwise steam vessels subject to the jurisdiction of the Steamboat Inspection Service, they shall be divided into the following classes:

(*a*) Passenger steam vessels.

(*b*) Passenger steam vessels the keels of which are laid after July 1, 1915.

(*c*) Cargo steam vessels and all other steam vessels unless hereinafter provided for.

LIFEBOATS AND LIFE RAFTS REQUIRED.

LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (A).

2. Vessels of class (*a*) shall be required to have lifeboat and life-raft capacity to accommodate all persons on board. Not less than 75 per cent of the total capacity shall be in lifeboats and 25 per cent may be in collapsible lifeboats or life rafts of an approved type.

Vessels of class (*a*) during the interval between May 15 and September 15 in any one year, both dates inclusive, shall only be required to be equipped with lifeboats and life rafts to accommodate 70 per cent of all persons on board, not less than 50 per cent of which shall be in lifeboats and 50 per cent may be in collapsible lifeboats or life rafts.

LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (B).

3. Vessels of class (*b*) shall be required to have lifeboat and life-raft capacity to accommodate all persons on board throughout the year, not less than 75 per cent of which shall be in approved lifeboats and 25 per cent may be in collapsible lifeboats or rafts of an approved type.

LIFEBOATS REQUIRED ON VESSELS OF CLASS (C).

4. *Vessels of class* (*c*), except cargo vessels hereafter provided f
shall carry sufficient lifeboats to accommodate all persons on boa
Provided, That vessels engaged exclusively in the business of pu
seining may use their wooden seine boats as lifeboats. Vess
engaged exclusively in the business of wrecking may use their wood
surf boats as lifeboats, and vessels engaged exclusively in the busin
of hook-and-line fishing from dories may use their dories as lifeboa
Provided, That the dories are fitted with air tanks of sufficient capac
to meet the rule for necessary air-tank equipment.

Cargo vessels shall carry a sufficient number of lifeboats on ea
side to accommodate all persons on board.

CARRYING OF LIFEBOATS ON VESSELS OF CLASSES (A) AND (B).

5. All vessels of classes (*a*) and (*b*) except those fitted with mecha
cal davits, shall, when the weather permits, have one of their lifebo
swung out on each side while at sea, brailed into a boom or rail a
ready for immediate use.

LIFEBOATS REQUIRED ON INSPECTED MOTOR VESSELS.

6. All vessels propelled by machinery, other than steam, subj
to the inspection laws of the United States, shall be required to ha
the same lifeboat and life raft equipment as steamers of the sa
class, and local inspectors shall also indicate in the certificate of insp
tion.

Motor vessels under 50 tons, when navigating in daylight only, a
when equipped with air tanks under deck of sufficient capacity
sustain afloat the vessel when full of water with her full compleme
of passengers and crew, or when properly subdivided by iron
steel water-tight bulkheads of sufficient strength and so arranged a
located that the vessel will remain afloat with her full compleme
of passengers and crew with any two compartments open to the s
shall be required to have not less than 100 cubic feet of lifeb
capacity. (Sec. 4426, R. S.)

LIFEBOATS AND OTHER EQUIPMENT REQUIRED ON SAIL VESSELS.

7. Coastwise vessels carrying passengers under the provisio
of section 4417, Revised Statutes, as amended by the act of Congr
approved March 3, 1905, shall be subject to the same requireme
for lifeboat capacity as coastwise steamers of the same class, and
addition thereto they shall be equipped with a life preserver for ea
and every person on board.

LIFEBOATS AND THEIR EQUIPMENT REQUIRED ON SEAGOING BARGES OF 100 GR TONS OR OVER.

8. The lifeboats required on seagoing barges of 100 gross tons
over shall be at least 14 feet long and equipped as follows:

A properly secured life line the entire length on each side, f
tooned in bights not longer than 3 feet, with a seine float in ea
bight.

At least two life preservers.

One painter of manila rope of not less than 2¾ inches in circu
ference and of suitable length.

Four oars of suitable length for size of boat.

Not less than four rowlocks attached to the boat with chains.

One boat hook attached to a staff of suitable length.

One bucket.

On wooden boats there shall be two plugs secured with chains for each drain hole.

EQUIPMENT FOR LIFEBOATS.

9. All lifeboats on coastwise steam vessels shall be equipped as follows:

A properly secured life line the entire length on each side, festooned in bights not longer than 3 feet, with a seine float in each bight. The life line shall be of a size and strength not less than 12-thread manila rope, and the seine float in each bight shall hang to within 12 inches of the surface of the water when the boat is light.

One painter of manila rope of not less than 2¾ inches in circumference and of suitable length.

A full complement of oars and two spare oars.

One set and a half of thole pins or rowlocks attached to the boat with separate chains.

One steering oar with rowlock or becket and one rudder with tiller or yoke and yoke lines. In boats of special construction where a rudder is difficult of installation it may be dispensed with.

One boat hook attached to a staff of suitable length.

Two life preservers.

Two hatchets.

One galvanized-iron bucket with lanyard attached.

One bailer.

Where automatic plugs are not provided there shall be two plugs secured with chains for each drain hole.

One efficient liquid compass with not less than a 2-inch card.

One lantern containing sufficient oil to burn at least nine hours and ready for immediate use.

One can containing 1 gallon of illuminating oil.

One box of friction matches wrapped in a waterproof package and carried in a box secured to the underside of the stern thwart.

A wooden breaker or suitable tank fitted with a siphon, pump, or spigot for drawing water, and containing at least 1 quart of water for each person.

Two enameled drinking cups.

A water-tight receptacle containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread or United States Army ration. The receptacle shall be of metal, fitted with an opening in the top not less than 5 inches in diameter, properly protected by a screw cap made of heavy cast brass, with machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

The United States Army ration above referred to may be any emergency ration of cereal or vegetable compound approved or used by the Army or Navy, but no ration of meat or any ration requiring saline preservative shall be allowed.

One canvas bag, containing sailmaker's palm and needles, sail twine, marline, and marline spike.

A water-tight metal case containing 12 self-igniting red ligh capable of burning at least 2 minutes: *Provided,* That one standa 3-cell focusing flash light and 3 extra standard batteries contained a portable water-tight metal case may be substituted for 6 of t required 12 self-igniting red lights.

A sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so co structed that the oil can be easily distributed on the water and s arranged that it can be attached to the sea anchor.

A mast or masts with one good sail at least and proper gear f each (this does not apply to motor lifeboats), the sail and gear to protected by a suitable canvas cover. In case of a steam vess which carries passengers in the North Atlantic and is provided wit a radiotelegraph installation, all the lifeboats need not be equippe with masts and sails. In this case at least one of the boats on eac side shall be so equipped.

All loose equipment shall be securely attached to the boat to whic it belongs.

Lifeboats of less than 180 cubic feet capacity on pleasure steame are not required to be equipped as above.

DRAWINGS, SPECIFICATIONS, NAME PLATE.

10. All *lifeboats* shall be substantially constructed in accordan with drawings, or blue prints, and specifications approved by t supervising inspector of the district in which the lifeboats are buil

Builders of lifeboats shall furnish the supervising inspector of t district in which the lifeboats are built drawings, or blue prints, an specifications showing and explaining the construction of same, an showing the tensile strength and ductility of the metal used. T metal used shall have a tensile strength of not less than 40,000 poun per square inch, and an elongation in length of 4 inches of at lea 20 per cent when the thickness of the metal is of, or greater tha No. 16 B. W. G., and 15 per cent when the thickness of the metal less than No. 16 B. W. G.

Builders of lifeboats shall affix a plate or other device to each lif boat, having thereon the builder's name, number of boat, date construction of boat, cubical contents of boat, and number of perso said boat will carry, as determined by the rules of the Board Supervising Inspectors. (Secs. 4405, 4488, R. S.)

INSPECTION OF LIFEBOATS WHEN BUILT.

11. Supervising inspectors of districts where lifeboats are bui shall detail an assistant or local inspector to any place where lif boats are being built, whose duty it shall be to carefully inspect a examine the construction of such lifeboats, and he shall satisfy hi self that such lifeboats are constructed in accordance with the dra ings, or blue prints, and specifications furnished by the builde When the assistant or local inspector approves the construction of t boat, he shall stamp his initials, together with the letters "U. S. I. on a blank space on the plate required to be affixed to the boat the builder. The initials of the assistant or local inspector shall satisfactory evidence to all parties interested that the boat has bee constructed in accordance with the drawings, or blue prints, a specifications on file. (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF METALLIC LIFEBOATS FOR COASTWISE STEAMERS.

12. All metallic lifeboats for coastwise steamers shall be constructed in accordance with the following specifications:

The *keels, stems, sternposts, gunwales, and nosings* shall be of clear-grain, sound oak or other suitable wood, each in one length, except that the gunwales and nosings may be made in two lengths. When made in two lengths, the gunwales shall be scarfed with a good long bevel scarf stiffened on the underside by a piece of gunwale material at least 2 feet in length, 1½ inches thick, and the width of the gunwale.

The *stem* of each boat shall be of a natural or steam crook, scarfed at least 9 inches in length on the keel and fastened thereto with two three-eighths inch through clinch bolts driven through deadwood fitted on the inside.

Each *sternpost* shall be stepped over the end of the keel half the length of sternpost and recessed at least 2½ inches deep into keel, the whole to be secured on the inside by a crook or knee of sufficient width to receive the flanges of the shell plates.

Each joint of the stem and sternpost shall be fitted with two three-eighths inch *stopwaters* under the shell flanges. Stem and sternpost shall be bearded to not less than 1½ inches.

The *flanges of shell plates* on boats not over 20 feet long shall lap on the keel, stem, and sternpost at least 2¼ inches; on boats over 20 feet and not over 24 feet long, at least 2½ inches; and on boats over 24 feet long, at least 2¾ inches, to be fairly drawn up and nailed over a strip of No. 6 cotton duck the width of the flanges, which shall be secured by three rows of galvanized nails driven zigzag. No part of the keel, stem, or sternpost outside of the shell flanges shall be covered with sheet metal.

In boats not over 20 feet long the *nails* shall be driven zigzag on lines three-eighths, 1⅛, and 1⅞ inches, respectively, from the edge of the flanges, and pitched 1¾ inches. In boats over 20 feet and not over 24 feet long the nails shall be driven on lines three-eighths, 1¼, and 2⅛ inches, respectively, from the edge of the flanges, and pitched 1⅝ inches. In boats over 24 feet long the nails shall be driven on lines three-eighths, 1⅜, and 2⅜ inches, respectively, from the edge of the flanges, and pitched 1½ inches.

In boats not over 20 feet long the nails shall be not less than 1¾ inches long, No. 10 B. W. G. In boats over 20 feet and not over 24 feet long the nails shall be not less than 2 inches long, No. 10 B. W. G. In boats over 24 feet long the nails shall be not less than 2½ inches long, No. 9 B. W. G.

Metallic lifeboats of a length not over 20 feet shall be constructed of *plates* of not less thickness than No. 18 B. W. G. Boats over 20 feet and not over 24 feet long shall be constructed of plates of not less thickness than No. 16 B. W. G. Boats longer than 24 feet shall be constructed of plates of not less thickness than No. 14 B. W. G.

All *seams and joints* shall be properly double riveted. The seams and butt laps shall lap at least 1¼ inches.

The center of the row of *rivets* nearest the edge of a sheet shall be about three-eighths of an inch from the edge. Rivets shall be staggered, with not less than 18 rivets to the foot, and shall have countersunk heads. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The keels, stems, and sternposts shall be not less than the followi sizes:

Length of boat.	Width of keel, stem, and stern-post.	Depth keel, ste and ste post.
	Inches.	*Inches*
Not over 18 feet	1.8	
Over 18 and not over 20 feet	2.0	
Over 20 and not over 21 feet	2.1	
Over 21 and not over 22 feet	2.2	
Over 22 and not over 23 feet	2.3	
Over 23 and not over 24 feet	2.4	
Over 24 and not over 25 feet	2.5	
Over 25 and not over 26 feet	2.6	
Over 26 and not over 27 feet	2.7	
Over 27 and not over 28 feet	2.8	

The keels of all boats over 26 feet long shall be strengthened by t addition of a main *keelson* extending not less than two-thirds t length of the boat and having one-half the area of the main keel, which it shall be through fastened with ⅜-inch clinch bolts spaced n more than 14 inches.

Steel having one-sixth the sectional area of wood found by the abo table may be used in lieu of wood for keels, stems, and sternposts metallic lifeboats.

All steel keels, stems, and sternposts shall be painted with two coa of red lead and oil.

The shell plates shall be riveted to the steel keels, stems, and ster posts with button-head rivets of not less than three-sixteenths of inch in diameter for boats less than 24 feet in length, not less th one-fourth of an inch in diameter for boats of 24 feet up to a including 27 feet in length, and not less than five-sixteenths of inch in diameter for boats from 28 feet up to and including 30 fe in length.

The rivets shall be staggered not less than 12 rivets to the foot.

The shell plating attached to the steel keels, stems, and sternpo shall be laid over flannel or felt and red lead to insure watertightne Any form of joint insuring the same result may be approved by t supervising inspector of the district in which the lifeboat is built.

The size of gunwales shall be of not less than the following dimensio

Length of boat.	Depth of gunwale.	Width gunwa
	Inches.	*Inche*
Not over 18 feet	1¾	
Over 18 and not over 20 feet	1⅞	
Over 20 and not over 22 feet	2	
Over 22 and not over 24 feet	2⅛	
Over 24 and not over 26 feet	2¼	
Over 26 and not over 28 feet	2⅜	

The gunwales of boats not over 22 feet long shall be attached the thwarts by steel *braces* at least 1¼ inches wide by five-sixteen of an inch thick, teed 4 inches on the thwarts and secured there by two ¼-inch carriage bolts, and to the gunwales by a ¼-i bolt clinched over the plate on the outside. In boats over feet long, such steel braces shall be at least 1½ inches by three-eighths of an inch, teed 5 inches on the thwarts and secured thereto by three one-fourth-inch carriage bolts, and to the gunwales by five-sixteenths-inch bolts clinched over the plate on the outside. All sheer plates shall come up on the gunwale to within one-half inch of its top and be nailed thereto with 1½-inch boat nails spaced 6 inches.

Angle-bar steel gunwales may be used for all lifeboats when the cross-sectional area of the same is of at least one-sixth the cross-sectional area of the wooden gunwale as now specified and required, subject to the suspension test required of lifeboat when loaded with its full complement of persons and equipment.

All *nosings* shall be formed of so-called half rounds, mitered to fit fairly against the gunwales and sheer plates, through which they shall be nailed to the gunwales every 6 inches with wire nails of No. 10 gauge and not less than 2¾ inches long. The flat side of nosings on boats of not over 20 feet long shall be not less than 1⅜ inches wide and five-eighths of an inch thick. On boats over 20 feet and not over 24 feet long the flat side of the nosing shall be not less than 1⅞ inches wide and 1 inch thick through the round. On all boats over 24 feet long the flat side of the nosing shall be not less than 2¼ inches wide and 1 inch thick through the round.

All *thwarts* shall be made of clear yellow pine or fir.

In boats not over 20 feet long thwarts shall be at least 1⅛ inches thick by 7½ inches wide. In boats over 20 feet and not over 24 feet long they shall be at least 1¼ inches thick by 8 inches wide. In boats over 24 feet long they shall be 1⅜ inches thick by 9 inches wide. All thwarts over 4½ feet long shall be supported by *stanchions* of pine 1 inch by 5 inches. Every thwart shall be secured at each end to the boat side by a double or U flange of No. 16 plate riveted to the shell with five rivets. The thwarts shall be pushed in between those flanges and secured thereto by five boat nails driven down through the upper flanges, thwarts, and lower flanges, and turned over beneath.

Breasthooks formed of steel for boats not over 20 feet long shall be one-fourth inch thick and 1¼ inches wide. In boats over 20 feet and not over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1⅜ inches wide. In boats over 24 feet long such hooks shall be five-sixteenths of an inch thick by 1½ inches wide.

No such breasthooks shall be less than 9 inches long.

Breasthooks shall be fastened through the gunwales each side with three one-fourth-inch button-head bolts clinched over the shell plate. All such breasthooks shall be upset in the throat sufficient to allow the upper bolt through the ring strap to pass through the hook without reducing the sectional area thereof.

The *midship footings* in boats not over 18 feet long shall be not less than seven-eighths of an inch thick, and have two footings on each side, which footings shall be seven-eighths of an inch thick by 7 and 5 inches wide, respectively. The midship footings in boats over 18 feet and not over 24 feet long shall be not less than 1 inch thick by 12 inches wide and have three footings on each side, which shall be 1 inch thick by 7, 6, and 4 inches, respectively, in width. The midship footings in boats over 24 feet and not over 26 feet long shall be not less than 1 inch thick and 12 inches wide, and such boats shall have not less than three footings on each side, each to be not less than 1 inch thick by 7, 6, and 4½ inches, respectively, in width. Boats over 26 feet long having a keelson shall have three footings on each side 1 inch thick by 8, 6, and 5 inches, respectively, in width. All said footings shall be fitted fairly to the bottom over a coat of lead paint and held in place by straps of No. 18 plate, 1⅛ inches wide, riveted with four rivets to the boat shell. The strap shall pass up through an aperature in the middle of each footing and receive a toggle of gas pipe five-eighths of an inch diameter and of a length not less than two-thirds of the width of the footing. There shall be not less than four such toggles in each footing in boats not over 20 feet long, nor less than five such toggles in boats over 20 feet and not over 24 feet long. In boats over 24 feet long there shall be six such toggles in each footing. The midship footings shall be secured to the bottom by straps and toggles in two rows placed 3 inches from each edge of the footing, and fastened with toggles of one-half inch pipe 3½ inches long. Hardwood toggles may be used in lieu of pipe when the same are formed of oak of so-called half rounds, 1 inch on their flat side and three-fourths of an inch thick. Iron or steel of so-called half rounds not less than five-eighths of an inch on the flat side and not less than three-sixteenths of an inch thick may also be used for toggles.

The *tackle rings* in boats not over 18 feet long shall be formed of not less than five-eighths-inch round steel. In boats over 18 feet and not over 22 feet long such rings shall be formed of not less than three-fourths-inch round steel. In boats over 22 feet and not over 26 feet long such rings shall be formed of not less than thirteen-sixteenths-inch round steel. In boats over 26 feet long such rings shall be formed of not less than seven-eighths-inch round steel. Such rings shall be welded through eyes of equal strength in the ring straps, which straps shall have a sectional area on each side of the upper bolt hole equal to that of the ring, and the sectional area of strap on each side of the next bolt hole shall be two-thirds that of such ring, and on each side of the next row of both holes one-half that of such ring. *Hooks* may be allowed in lieu of rings when constructed of equal strength to rings and attached to the boat as securely as the rule provides for rings.

The pitch of bolt holes in all such straps shall be 3 inches.

In boats not over 18 feet long said ring straps shall be secured with three bolts one-half of an inch in diameter. In boats over 18 feet and not over 22 feet in length such ring straps shall be secured by three bolts five-eighths of an inch in diameter. In boats over 22 feet and not over 26 feet long such ring straps shall be secured by four bolts five-eighths of an inch in diameter. In boats over 26 feet long such ring straps shall be secured by five bolts, the upper two of which shall be five-eighths of an inch in diameter and the other three nine-sixteenths of an inch in diameter. The two upper bolts shall be driven through and clinched on the outer edge of the stem and sternpost. The lower bolt or bolts may be driven blunt 3½ inches into the stem and sternpost. The upper bolts shall pass through the breasthooks.

Each and every lifeboat shall be fitted with a *painter ring* properly secured of a size and strength not less than that specified for tackle rings.

All boats shall be fitted with *rudders* made of clear, straight-grained oak or fir, which shall be stiffened across the bottom edge by a piece of wood of the same character, properly nailed.

All gudgeons and pintles shall be strapped to the wood and through fastened, and be so adjusted that the lower pintle will project at least 1½ inches more below its gudgeon than does the upper one.

Each lifeboat shall be fitted with an *automatic plug.*

All the shell plates, air tanks, nails, gunwale braces, rudder braces, and fastenings of metallic boats shall be *galvanized* when said parts are made of steel or iron.

The *gauge* numbers given in Rule III are the Birmingham standard (B. W. G.).

This section shall apply to all metallic lifeboats built after June 30, 1912. (Secs. 4405, 4488, R. S.)

AIR TANKS OF LIFEBOATS.

13. All lifeboats contracted for after September 30, 1912, shall have not more than 50 per cent of the air-tank capacity in the ends of the boat and the remaining capacity shall be located in the side tanks.

After June 20, 1912, the air tanks of all lifeboats shall be entirely independent of the hull or other construction and shall be of suitable noncorrosive material and of a capacity of not less than 1.5 cubic feet for each person allowed in metallic boats and not less than 1 cubic foot for each person allowed in wooden boats. Such air tanks shall be firmly and securely fastened in the hull, and in such manner as will allow them to be temporarily removed, and in no case shall the tanks be punctured or opened for such fastenings. The tops of such tanks shall be thoroughly protected by a grating or platform or by the thwarts or seats. Such air tanks of 6 cubic feet or less shall be constructed of material of a thickness not less than No. 22 B. W. G.; from 6 cubic feet to and including 15 cubic feet, of a thickness not less than No. 20 B. W. G.; and all air tanks of more than 15 cubic feet capacity shall be of a thickness not less than No. 18 B. W. G.

All joints of air tanks shall be properly double riveted and tightly calked or securely hook jointed and efficiently soldered or properly and securely welded, and such air tanks shall be located in such a manner that will permit the lifeboat to be on as near an even keel as possible when flooded with water.

The cubical contents of air space of air tank shall be stamped on the tank where same can be seen when air tank is placed in boat.

All air tanks shall be fitted with a connection of one-half inch outside diameter, for testing purposes.

Before any lifeboat is passed and accepted, the air tanks thereof shall be tested in the presence of an inspector of this Service by an air pressure of not more than 1 pound to the square inch. At each subsequent annual inspection, or oftener if in the opinion of the inspectors it is necessary or desirable, the inspectors shall satisfy themselves that the tanks are in good condition, but pressure need not be applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF WOODEN LIFEBOATS.

14. Wooden lifeboats shall be substantially constructed and every way equal in strength and stability to a metallic boat built accordance with the above specifications. (Sec. 4488, R. S.)

CARRYING CAPACITY OF LIFEBOATS.

15. The capacity of all lifeboats not otherwise provided for shall determined by the following rule: Measure the length and bread outside of the planking or plating and the depth inside at the pla of minimum depth. The depth used in calculating shall not in an case exceed 45 per cent of the breadth. The product of the dimensions multiplied by 0.6 resulting in the nearest whole numb shall be deemed the capacity in cubic feet.

To determine the number of persons a boat is to carry, divide t result by 10 for coastwise steamers.

Example.

The carrying capacity of a boat 22 feet in length, 6 feet in breadt and 2½ feet in depth shall be determined as follows:

For ocean steamers,

$$\frac{22\times6\times2\tfrac{1}{2}\times0.6}{10}=\frac{198}{10}=19\text{ persons.}$$

Every lifeboat shall have sufficient room, freeboard, and stabilit to safely carry the number of persons allowed to be carried by t above rule, which fact shall be determined by actual test in the wat at the time of the first inspection of the lifeboat, except that where vessel is carrying lifeboats of different types or capacities, at least o lifeboat of each type or capacity shall be so tested.

SIZE OF BOATS.

16. No lifeboat for use on coastwise steam vessels shall be of les than 180 cubic feet capacity, except that all pleasure steamers, an other steamers not exceeding 1,000 gross tons limited by their ce tificate of inspection to routes not exceeding 15 miles from any ha bor shall only be required to carry one lifeboat of 180 cubic fee capacity. Nothing, however, shall exempt such steamers from ca rying the aggregate cubic capacity required by the rules. Th minimum capacity of lifeboats for this class of vessels shall be 12 cubic feet.

The supervising inspector of the district may, in exceptional case permit lifeboats of less than 180 cubic feet as a substitute for sai boat on steamers where the crew is insufficient to properly handle boat of that size, or where there is lack of space to properly carry s large a lifeboat, but in every such case the steamer shall be provide with one or more lifeboats efficient in character and large enough t carry every person on board, and in no case shall the lifeboat be c less capacity than 125 cubic feet.

Provided further, That on steamers of 100 gross tons and unde operating within 5 miles of land, where there is a lack of space t properly carry a boat of 125 cubic feet, the supervising inspecto of the district may permit lifeboats of less than 125 cubic feet, pro vided they are large enough and of suitable character to carry ever person on board. (Sec. 4488, R. S.)

TESTS OF BOATS AT ANNUAL INSPECTION.

17. The inspectors shall satisfy themselves that every lifeboat, together with its equipment, of all vessels, is in every respect in good condition and ready for immediate use.

Every lifeboat, with its required equipment, of passenger vessels, shall be lowered to near the water and loaded to its allowed capacity, evenly distributed throughout its length, and then lowered into the water afloat. In making this test, persons or dead weight may be used. If persons are used, the weight of each person shall average at least 140 pounds. When dead weight is used, the weight shall be equivalent to at least 140 pounds for each person allowed. (Secs. 4405, 4488, R. S.)

CARE OF LIFEBOATS.

18. Lifeboats shall be stripped, cleaned, thoroughly overhauled and painted at least once in every year. (Sec. 4488, R. S.)

BOAT-DAVIT FALLS AND RECEPTACLES THEREFOR.

19. It shall be the duty of the master or officer in charge of all vessels to see that the boat-davit falls shall at all times be in readiness for immediate use, and protected from ice, and not painted, and such boat-davit falls on all boats not swung out at boat drills shall be cast loose and overhauled; and it shall be unlawful to stow in any lifeboat articles other than those required by law and regulations. On all steamers over 1,000 gross tons, covered tubs, boxes, or reels shall be provided in which to stow away the boat-davit falls.

Where more than one lifeboat is served under one set of davits, means shall be provided that will prevent davit tackles from twisting or capsizing, and that will permit the tackles being readily rounded up for the purpose of launching the remaining lifeboats under such davits: *Provided,* That when davits are equipped with separate tackles for each boat, such nontwisting and noncapsizing device is not required. (Secs. 4405, 4488, R. S.)

MARKING OF LIFEBOATS.

20. All lifeboats shall have the number of boat plainly marked or painted on each bow, in figures not less than 3 inches high. Where lifeboats are carried on both sides of a vessel, lifeboat No. 1 shall be forward on starboard side of vessel, lifeboat No. 2 forward on port side, lifeboat No. 3 next abaft lifeboat No. 1 on starboard side, lifeboat No. 4 next abaft lifeboat No. 2 on port side, and so forth, the odd-numbered boats being on the starboard side and the even-numbered boats being on the port side of vessel. All lifeboats shall have their cubic contents and the number of persons such lifeboat is allowed to carry plainly marked or painted on each bow in letters and figures not less than three-fourths of an inch high. All lifeboats shall also have the number of persons allowed to be carried plainly marked or painted on top of at least two of the thwarts, in letters and figures not less than 3 inches high. When the letters and figures above required are painted on lifeboats, such letters and figures shall be dark on a light ground or light on a dark ground. (Secs. 4405, 4488, R. S.)

HOW LIFEBOATS SHALL BE CARRIED AND DAVITS AND CRANES REQUIRED.

21. All lifeboats on vessels carrying passengers shall, if practicable, be carried under substantial davits or cranes, but if it is not practicable so to carry all the lifeboats required, the remainder shall be stowed near at hand, so as to be easily and readily launched. Such davits, cranes, and necessary gear shall be such as will enable the lifeboats to be lowered to the water in less than two minutes from the time the clearing away of the boats is begun.

Each lifeboat carried under davits shall be provided with two separate davits. When a single crane is properly adapted to lower a lifeboat, it may be allowed to take the place of the two davits. Such davits or cranes, and the blocks and falls thereof, on all passenger vessels, shall be of sufficient strength to carry the boat with its full load.

On and after May 1, 1920, the complete installation of all mechanical boat davits shall be tested and demonstrated for strength and efficiency at the place of manufacture in the presence of an inspector of the Steamboat Inspection Service.

The frame, gear, worms, arms, and all machinery in connection with the operation of the device shall be set up in the shop in the same manner as when installed for use on board the ship and shall be tested in the following manner: A weight equal to the weight of the boat with its equipment and complement of persons that the davit is intended to serve, the weight of the persons being considered as 140 pounds each, shall be suspended from the eye or end of each davit arm, and while the weight is in suspension the davit arm shall be operated from the inboard position to the full outboard position, with the same operating crank or device that is used in actual practice on board the ship. Under this test the davit arm shall show no permanent set or deflection, and the frame, gear, and operating mechanism shall show no distress or distortion. While this test is being conducted, the frame, gear, and operating mechanism, if of cast material, shall be subjected to a test by being well hammered, to satisfy the inspector that the castings are sound and without flaw.

When the assembled installation meets the foregoing requirements and the inspector is satisfied that the device is sufficient in strength and operation, he shall stamp the davit arm and the frame to which it is attached, which shall bear identical numbers of the manufacturer, with the letters "U.S.I.," the initials of his name, and a serial number.

When steel castings are employed for frames or davit arms, the castings shall be thoroughly annealed, and the tensile strength of the castings shall be not less than 58,000 pounds nor more than 78,000 pounds per square inch, with an elongation of not less than 24 per cent in a length of 2 inches measured on the test piece used in determining the tensile stress. The test piece shall have a section not less than 2½ inches in the center turned down to not less than one-half-inch diameter. An inspector of this service shall witness this test. Sample pieces must be a part of the annealed casting and must represent the casting after it has been thoroughly annealed, and if the casting has afterwards been heated for any purpose it shall be again annealed. The manufacturer shall furnish the inspector, when required, an affidavit setting forth the fact that the required tests respecting annealing have been fully complied with.

Pacific Sa [illegible] Investigations
U. S. Fish & Wildlife Service
Seattle, Washington.

The davit arm, if of cast material, shall be raised to an angle of 45°, the lower end resting upon the ground, and dropped on a hard unyielding base, and then slung up and subjected to a test by being well hammered with a sledge hammer not less than 7 pounds in weight, to satisfy the inspector that the casting is sound and without flaw. An inspector of the Steamboat Inspection Service shall be present at the foundry where such castings are made, and when the foregoing specifications and tests referred to in this paragraph have been complied with to his satisfaction, he shall stamp the davit arm and the davit frame with the letters "U. S. I.," the initials of his name, and the letters "F. T.," indicating that the foundry tests have been complied with.

No davit arm or frame comprising mechanical davits shall be placed on board any vessel until all these requirements have been fully complied with.

After October 31, 1926, all cast-steel mechanical davits carried in stock, which have not been tested as above described, shall be subjected to the drop, hammer, suspension, and turning-out tests, and stamped by an inspector, all as above described, before such davits are accepted as lawful equipment. (Secs. 4405, 4488, R. S.)

LIFEBOATS AND LIFE RAFTS KEPT CLEAR FOR LAUNCHING.

22. The decks on which lifeboats of any class or life rafts are carried shall be kept clear of freight or any other obstruction that would interfere with the immediate launching of the lifeboats or life rafts. (Secs. 4405, 4488, R. S.)

HANDLING OF THE BOATS AND RAFTS.

23. All the boats and rafts shall be stowed in such a way that they can be launched in the shortest possible time and that, even under unfavorable conditions of list and trim from the point of view of the handling of the boats and rafts, it may be possible to embark in them as large a number of persons as possible.

The arrangements shall be such that it may be possible to launch on either side of the vessel as large a number of boats and rafts as possible.

At least once in each interval of not longer than three months the master of every inspected passenger vessel shall drill and exercise every member of the crew, except females, in pulling oars in the ship's lifeboats.

In addition, the crew of the motor-propelled boats shall demonstrate their ability in the working of the engine and handling of the boat under power.

CHARLES R. M'COTTER LIFEBOAT.

24. Lifeboats of this type, 13 feet in length, 1 foot 10 inches in height, and 4 feet in width, shall be allowed to carry eight persons. The number of persons allowed to be carried on boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. In all cases the air tanks in such boats shall be constructed in accordance with the rules and regulations for air tanks. (Sec. 4488, R. S.)

BRUDE LIFEBOAT.

25. Lifeboats of the Brude type, of the sizes specified below, for use on cargo steamers, shall be allowed the following rating:

Length.	Height.	Width.	Number of persons carried and allowed on cargo steamers.
Feet.	*Ft. in.*	*Ft. in.*	
18	8 0	8 0	34
14	6 9	6 9	17

The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

INCLOSED LIFEBOATS.

26. All steamers carrying passengers shall be equipped with at least one lifeboat of approved open standard type. Where two lifeboats are required, one of the same may be of an approved inclosed type. Where three or more lifeboats are required, two of such lifeboats shall be of approved open standard type, one to be carried on each side under davits. In no case shall the lifeboat equipment of any steamer consist of more than 50 per cent of approved lifeboats of inclosed type.

When the approved inclosed type of lifeboats is carried on steamers other than those carrying passengers, such steamers shall also be equipped with one lifeboat of approved open standard type of not less than 180 cubic feet capacity. (Sec. 4488, R. S.)

NEWCOMB INCLOSED LIFEBOAT.

27. Lifeboats of this type, 26 feet in length, 6 feet 4 inches in breadth, and 3 feet 4 inches in depth, when constructed in accordance with the rules for lifeboats, shall be allowed to carry 25 persons.

The number of persons allowed to be carried by boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488, R. S.)

LUNDIN AND LANE LIFEBOATS.

28. *Lundin decked lifeboats and Lane decked metallic lifeboats* shall be rated and accepted as lifeboats under davits and may be placed in nests of two under a single pair of davits, but such nesting shall not commence until each set of davits as required by law is first fitted with a required lifeboat. They shall be fully equipped as lifeboats as required by these rules and regulations and shall be measured in accordance with the following formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic foot.}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = depth from top of keel to top of gunwale, in feet.

Example.

28 feet × 9.5 feet × 2.5 feet × 0.9 = 598.5 cubic feet.

Allow 10 cubic feet to a person, 598.5 ÷ 10 = 59 persons.

Provided, That when the Lundin decked lifeboats and Lane decked metallic lifeboats are loaded to their full capacity the water-tight deck shall be not less than 2 inches above the load water line, and shall have an excess buoyancy in air space and fenders of not less than 25 per cent of the combined weight of boat and load. Not less than 10 per cent of the total buoyancy shall be in fenders of buoyant material firmly secured to the outside of the boat.

The following example is given in explanation of the above proviso:

Example.

26 feet, 50 persons, Lundin decked lifeboat or Lane decked metallic lifeboat.

Height of load water line, 15 inches. Required height of inner deck = 15 inches + 2 inches = 17 inches. Combined weight of boat and load (each person allowed figured at 165 pounds), 12,250 pounds. Excess buoyancy required in air space and fenders above = 0.25 × 12,250 = 3,062.5 pounds. Total buoyancy required, i. e., buoyancy of air space below water-tight deck plus buoyancy of entire fenders, = 12,250 + 3,062.5 = 15,312.5 pounds. Buoyancy required in entire fenders = 0.10 × 15,312.5 = 1,531.25 pounds.

The carrying capacity of the Lundin *power* lifeboat shall be determined by the same rule as the Lundin decked lifeboat and Lane decked metallic lifeboat, with proper reduction for the weight and space used for the motors, tanks for fuel, and wireless apparatus.

The carrying capacity of the Lundin *housed* lifeboat shall be determined by the same rule as the Lundin decked lifeboat and Lane decked metallic lifeboat.

Lundin semidecked lifeboats shall be rated and accepted as lifeboats under davits and may be placed in nests of two under a single pair of davits, but such nesting shall not commence until each set of davits as required by law is first fitted with a required lifeboat. They shall be fully equipped as lifeboats as required by these rules and regulations and shall be measured in accordance with the following formula:

$$\text{Cubic capacity} = L \times B \times D \times 0.9 \text{ cubic feet.}$$

Where L = length over all, in feet.
B = width over fenders, in feet.
D = depth from top of keel to top of gunwale, in feet.

Example.

20 feet × 7 feet × 2 feet × 0.9 = 252 cubic feet.

Allowing 10 cubic feet to a person, 252 ÷ 10 = 25 persons.

Provided, That the length of the Lundin semidecked lifeboat does not exceed 24 feet; that the above boat is provided with independent air tanks, placed at the sides of the boat, built in accordance with the general rule for air tanks of lifeboats and with a capacity of not less than 1½ cubic feet for each person allowed; that the above boat is provided with built-in water-tight compartments, one in each end, and provided with a water-tight manhole, and that not less than 10 per cent of the volume of the displacement to the load water line shall be in fenders of buoyant material firmly secured to the outside of the boat.

The Lundin *open* lifeboat with balsa wood fenders, 24 feet in length, 7 feet 1 inch in breadth inside fender, 8 feet in breadth outside fender, and 3 feet 2 inches in depth, shall be allowed to carry 40 persons. The number of persons allowed to be carried on boats of this type of other dimensions shall be determined, after an actual demonstration, by the supervising inspector of the district in which the boat is accepted. (Sec. 4488 R. S.)

LIFE RAFTS.

DRAWINGS, SPECIFICATIONS, NAME PLATE, AND HOW MARKED.

29. All life rafts shall be substantially constructed in accordance with drawings, or blue prints, and specifications approved by the supervising inspector of the district in which the life rafts are built.

Builders of life rafts shall furnish the supervising inspector of the district in which the life rafts are built drawings, or blue prints, and specifications, showing and explaining the construction of same and showing the tensile strength and ductility of the metal used. The metal used shall have a tensile strength of not less than 40,000 pounds per square inch, and an elongation in a length of 4 inches of at least 20 per cent when the thicknesss of the metal is of or greater than No. 16 B. W. G., and 15 per cent when the thickness of the metal is less than No. 16 B. W. G.

Builders of life rafts shall affix a plate or other device to each life raft, having thereon the builder's name, number of raft, date of construction of raft, cubical contents of raft, and number of persons said raft will carry, as determined by the rules of the Board of Supervising Inspectors.

There shall be stenciled in a conspicuous place on each life raft now in use the number of persons said raft can carry, as hereinafter provided. (Secs. 4405, 4488, R. S.)

INSPECTION OF LIFE RAFTS WHEN BUILT.

30. Supervising inspectors of districts where life rafts are built shall detail an assistant or local inspector to any place where life rafts are being built, whose duty it shall be to carefully inspect and examine the construction of such life rafts, and he shall satisfy himself that such life rafts are constructed in accordance with the drawings, or blue prints, and specifications furnished by the builders. When the assistant or local inspector approves the construction of the raft he shall stamp his initials, together with the letters "U. S. I.," on a blank space on the plate required to be affixed to the raft by the builder. The initials of the assistant or local inspector shall be satisfactory evidence to all parties interested that the raft has been constructed in accordance with the drawings, or blue prints, and specifications on file.

This section shall apply to all life rafts constructed after June 30, 1912. (Secs. 4405, 4488, R. S.)

CONSTRUCTION OF RAFTS OF THE CATAMARAN TYPE.

31. All metal life-raft cylinders of more than 15 feet in length or of more than 16 inches in diameter shall be constructed of metal not

less than No. 18 B. W. G. No life-raft cylinders shall be of less thickness of metal than No. 20 B. W. G.

The retaining bands which secure the cylinders to the frames shall be made in halves, so that the cylinders may be detached without difficulty and without disassembling the body of the raft, for the purpose of inspection, cleaning, and painting, as required by section 32. Wooden guards and gunwales shall be secured to the retaining bands by angle-iron clips or by the jaws of the retaining bands. Iron rods extending across the raft at top and bottom shall pass through the gunwale and its securing clips or jaws at each end of the raft. The ends of the rods shall be properly secured with a screw nut inside and outside of the gunwale.

All such cylinders shall be divided by water-tight bulkheads into not less than three compartments of equal lengths. Cylinders over 9 feet in length shall be divided into equal lengths by water-tight bulkheads into not less than one compartment for every 3 feet of its length. One of such bulkheads shall be at the extreme end of each cylinder or as near thereto as the flange of cone or bumped ends will permit. Each compartment shall be provided with a suitable air-pump connection of one-half inch outside diameter, fitted with air-tight cap.

Only countersunk-headed rivets shall be used in the construction of metallic life rafts.

All seams and joints shall be properly double riveted.

The above provisions of this section shall take effect only as to life rafts constructed after December 31, 1908.

The circumferential as well as the longitudinal seams of life-raft cylinders shall be riveted and tightly calked, or securely hook jointed and efficiently soldered, or properly and securely welded on rafts constructed after June 30, 1905. Such longitudinal seams shall be secured by not less than 12 rivets to each foot, circumferential seams by not less than 10 rivets to each foot, and bulkheads by not less than 8 rivets to each foot. Bulkhead flanges may be single riveted. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The framework connecting the cylinders of metallic life rafts shall be substantially built and capable of resisting the strain which tends to break the cylinders apart when the raft is broadside on in surf or seaway. (Sec. 4488, R. S.)

TESTS OF AIR TANKS OF LIFE RAFTS.

32. Before any life raft is passed and accepted the air tanks thereof shall be tested in the presence of an inspector of this service by an air pressure of not more than 1 pound to the square inch. At each subsequent annual inspection, or oftener if in the opinion of the inspectors it is necessary or desirable, the inspectors shall satisfy themselves that the tanks are in good condition, but pressure need not be applied unless the inspectors are in doubt regarding the efficiency of the tanks. This does not take from the inspectors the right and authority to satisfy themselves at any time, either by examination or pressure, as to the condition of the tanks. (Sec. 4488, R. S.)

CARE OF LIFE RAFTS.

33. All life rafts shall be stripped, cleaned, painted, and thoroughly overhauled at least once in every year, and inspectors shall carefully

examine at all inspections the material which supports the platform of all life floats in order to determine to their satisfaction that the strength is maintained. If it is found that deterioration has begun, it shall be corrected even to the extent of requiring the renewal of the platform-supporting device. (Secs. 4405, 4488, R. S.)

APPROVED LIFE RAFTS.

34. Any type of life rafts approved by the Board of Supervising Inspectors shall be considered as equivalent to the standard raft above specified. (Sec. 4488, R. S.)

CARRYING CAPACITY OF LIFE RAFTS.

35. No type of raft may be approved for coastwise steam vessels unless it satisfies the following conditions:

First. It should be reversible.

Second. It should be of such size, strength, and weight that it can be handled without mechanical appliances, and, if necessary, be thrown from the vessel's deck.

Third. It must have not less than 3 cubic feet of air cases or equivalent buoyancy and not less than 3 square feet of deck surface for each person allowed. Rafts already in use may have the rating changed by the supervising or local inspectors of the district where the same are being used to meet these requirements and allowances.

Fourth. The air tanks or equivalent buoyancy should be placed as near as possible to the sides of the raft.

At least one-half of the number of life rafts on all steam vessels shall have a capacity exceeding 15 persons.

Tule and all other types of catamaran life rafts shall meet the requirements herein specified.

CATAMARAN TULE LIFE RAFTS.

36. Catamaran tule life rafts of the sizes specified below shall be allowed the following rating:

Length.	Diameter of cylinders.	Number of persons allowed.
Feet.	*Inches.*	
8	20	8
12	20	12
16	20	17
18	20	18
20	20	20

Catamaran tule life rafts having cylinders of a smaller diameter than specified above shall be tested by the local inspectors of the district in which they are built to determine the number of persons allowed to be carried by such rafts, which test shall consist of a practical demonstration. (Sec. 4488, R. S.)

CLARK LIFE RAFTS.

37. Clark life rafts shall be constructed, tested, and rated in accordance with the following specifications:

All cylinders of more than 16 inches in diameter shall be constructed of metal not less than No. 18 B. W. G., and no cylinder shall be of less thickness of metal than No. 20 B. W. G. Cylinders shall be provided with a suitable air-pump connection of one-half inch outside diameter, fitted with air-tight cap.

The inspection of life rafts shall include the testing of each compartment by air pressure.

The circumferential as well as the longitudinal seams of cylinders shall be riveted and tightly calked, or securely hook jointed and efficiently soldered, or properly and securely welded. Such longitudinal seams shall be secured by not less than 12 rivets to each foot, circumferential seams by not less than 10 rivets to each foot, and bulkheads by not less than 8 rivets to each foot.

Only countersunk-headed rivets shall be used in the construction of cylinders. The diameter of shank of rivets shall be not less than No. 10 B. W. G.

The framework connecting the cylinders shall be substantially built and capable of resisting the strain which tends to break the raft apart when the raft is broadside on in surf or when in seaway.

There shall be allowed for each person carried not less than 3 cubic feet of air space and a deck area of not less than 4 square feet.

On and after May 1, 1917, the iron or steel bolts and nuts used in the construction of Clark rafts for service on salt water shall be galvanized. Nuts shall not be countersunk in the wood frame, but shall be protected by a wooden batten properly fitted over the nuts and fayed neatly to the frame. (Sec. 4488, R. S.)

A B C LIFE FLOATS.

38. The A B C life float shall be allowed for use upon vessels under the jurisdiction of the Steamboat Inspection Service, and upon all waters, except offshore ocean service, when constructed in accordance with the blue prints and specifications submitted, and allowed a capacity in accordance with the following table:

No. of float.	Dimensions of float.				Diameter of cylinder.	Number of persons allowed.
	Length.		Width.			
	Ft.	*In.*	*Ft.*	*In.*	*Inches.*	
1	7	0	3	6	8	10
2	7	6	3	6	9	14
3	8	6	4	0	10	15
4	8	0	5	0	10	20
5	8	9	4	9	11	25
6	10	0	6	0	13	40
7	12	0	8	0	15	60

The cylinder shall be made of solid, encysted balsa wood, well treated with Marr's process in finished state, so as to insure buoyancy. Cylinder shall be covered with heavy canvas, and suspended from the cylinder shall be a strong, substantial net, at the bottom of which is fixed a platform of sufficient strength to sustain the number of persons allowed.

LANE BALSA LIFE FLOATS.

39. The Lane balsa life float shall be allowed for use upon vessels under the jurisdiction of the Steamboat Inspection Service, and upon all waters, except offshore ocean service, when constructed in accord-

ance with the blue prints and specifications submitted, and allowe a capacity in accordance with the following table:

No. of float.	Dimensions of float.				Diameter of cylinder.	Number of persons allowed.
	Length.		Width.			
	Ft.	*In.*	*Ft.*	*In.*	*Inches.*	
1	8	6	4	0	10	15
2	10	0	5	6	12	25

The cylinder shall be made of solid, encysted balsa wood, we treated with Marr's process in finished state, so as to insure buoyanc Cylinder shall be covered with heavy canvas, and suspended fro the cylinder shall be a strong, substantial net, at the bottom of whic is fixed a platform of sufficient strength to sustain the number c persons allowed.

A B C AND BALSA LIFE FLOATS.

40. All A B C or Balsa floats shall be carefully inspected and marke by inspectors of this service, in accordance with the requirements c Rule III governing such inspection, testing, and marking. (Sec 4481, 4488, R. S.)

41. CARLEY LIFE FLOATS.

No. of float.	Size of float.	Diameter of tube.	Minimum number of compartments.	Number of persons carried and allowed.
		Inches.		
1	8 by 4 feet	14¼	....	10
2	8 by 5 feet	16¼	....	11
3	10 by 6 feet	17¼	....	18
4	12 by 8 feet	20¼	....	33
5	3 feet 6 inches by 6 feet	12	8	6
6	3 feet 9 inches by 6 feet 6 inches	13	8	7
7	4 by 7 feet	14	8	9
8	4 feet 6 inches by 7 feet 6 inches	14	10	11
9	4 feet 6 inches by 8 feet 6 inches	14	12	13
10	5 by 8 feet	14	12	13
11	.....do	15	12	13
12	5 by 9 feet	15	14	16
13	5 by 10 feet	15	14	17
14	6 by 10 feet	16	....	28
15	6 feet 6 inches by 10 feet 6 inches	17	....	31
16	7 by 12 feet	18	....	41
17	8 by 12 feet	19	....	45
18	9 by 14 feet	20	....	67
19	5 by 8 feet	14½	....	18
20	5 by 10 feet	15½	....	20

CAMBRIDGE LIFE FLOATS.

The Cambridge life float, 9 feet in length and 6 feet 6 inches i width, shall be allowed a capacity of 25 persons. Other sizes c the same type shall be allowed a capacity comparing approximatel with the above capacity, which shall be determined by the supe vising inspector of the district where the float is manufactured aft an actual demonstration. Additional sizes approved: 5 feet wid 8 feet long, inner diameter 13 inches, allowed 16 persons; 7 feet wid 11 feet long, inner diameter 15 inches, allowed 38 persons; 6 fe wide, 10 feet long, 15 inches inside diameter of tube, allowed 1 persons. (Sec. 4488, R. S.)

USE OF BARSTOW LIFE RAFT PROHIBITED.

42. The use of the Barstow life raft is prohibited on vessels on any waters after February 28, 1914. (Sec. 4488, R. S.)

CAPACITY AND ALLOWANCE OF ENGELHARDT COLLAPSIBLE LIFEBOATS.

43. Engelhardt collapsible lifeboats may be carried as lifeboats and rated as class 2C, and shall be fully equipped as lifeboats as required by these rules.

The cubic capacity of Engelhardt collapsible lifeboats shall be determined in accordance with the following rule: Measure in feet and fractions of a foot the length and breadth outside of canvas extension and the depth inside at the place of minimum depth taken from the inside of the bottom planking of the bottom to the top of gunwale when extended. The product of these dimensions multiplied by 0.7 shall be deemed the capacity in cubic feet. (Sec. 4488, R. S.)

HANDLING OF THE RAFTS.

44. All rafts shall be stowed in such a way that they can be launched in the shortest possible time and that, even under unfavorable conditions of list and trim from the point of view of the handling of the rafts, it may be possible to embark in them as large a number of persons as possible.

The arrangements shall be such that it may be possible to launch on either side of the vessel as large a number of rafts as possible.

EQUIPMENT FOR LIFE RAFTS AND LIFE FLOATS.

45. All life rafts on coastwise steam vessels shall be equipped as follows:

A properly secured life line entirely around the sides and ends of the raft, festooned to the gunwales in bights not longer than 3 feet with a seine float in each bight.

One painter of manila rope of 2¾ inches in circumference, and of suitable length.

Four oars.

Five rowlocks properly attached.

One boat hook attached to a staff of suitable length.

One self-igniting life-buoy light.

One sea anchor.

A vessel containing 1 gallon of vegetable or animal oil, so constructed that the oil can be easily distributed on the water, and so arranged that it can be attached to the sea anchor.

A water-tight receptacle, containing 2 pounds avoirdupois of provisions for each person. These provisions may be hard bread or United States Army ration. The receptacle shall be of metal and fitted with an opening in the top not less than 5 inches in diameter, properly protected by a screw cap made of heavy cast brass, with machine thread and an attached double toggle, seating to a pliable rubber gasket, which shall insure a tight joint, in order to properly protect the contents of the can.

A water-tight receptacle containing 1 quart of water for each person.

Two enameled drinking cups.

A water-tight metal case containing six self-igniting red lights capable of burning at least two minutes.

A water-tight box of matches.

All loose equipment shall be securely attached to the raft to whic it belongs.

All life floats on coastwise steam vessels shall be equipped a follows:

A properly secured life line entirely around the sides and ends o the float, festooned to the gunwales in bights not longer than 3 feet with a seine float in each bight.

One painter of manila rope of 2¾ inches in circumference and o suitable length.

Four paddles.

One boat hook attached to a staff of suitable length.

One self-igniting life-buoy light.

A water-tight metal case containing six self-igniting red light capable of burning at least two minutes.

All loose equipment shall be securely attached to the float to whic it belongs. (Sec. 4488 R. S.)

CERTIFICATED LIFEBOAT MEN—MANNING OF THE BOATS.

46. There shall be for each boat or raft a number of lifeboat me at least equal to that specified as follows: If the boat or raft carrie 25 persons or less, the minimum number of certificated lifeboat me shall be 1; if the boat or raft carries 26 persons and less than 4 persons, the minimum number of certificated lifeboat men shall b 2; if the boat or raft carries 41 persons and less than 61 persons, th minimum number of certificated lifeboat men shall be 3; if the boat o raft carries from 61 to 85 persons, the minimum number of certificate lifeboat men shall be 4; if the boat or raft carries from 86 to 11 persons, the minimum number of certificated lifeboat men shall be if the boat or raft carries from 111 to 160 persons, the minimum number of certificated lifeboat men shall be 6; if the boat or raft carrie from 161 to 210 persons, the minimum number of certificated lifeboa men shall be 7; and, thereafter, 1 additional certificated lifeboat ma for each additional 50 persons: *Provided*, That if the raft carries 1 persons or less a licensed officer or able seaman need not be placed i charge of such raft: *Provided further*, That one-half the number rafts carried shall have a capacity of exceeding 15 persons.

The allocation of the certificated lifeboat men to each boat an raft remains within the discretion of the master, according to th circumstances.

By "certificated lifeboat man" is meant any member of the cre who holds a certificate of efficiency issued under the authority of th Secretary of Commerce.

In order to obtain the special lifeboat man's certificate the applica shall prove to the satisfaction of an officer designated by the Secreta of Commerce that he has been trained in all the operations connecte with launching lifeboats and the use of oars; that he is acquainte with the practical handling of the boats themselves; and, furthe that he is capable of understanding and answering the orders relati to lifeboat service.

MANNING OF BOATS.

47. A licensed officer or able seaman shall be placed in charge each boat or pontoon raft; he shall have a list of its lifeboat men, an other members of its crew which shall be sufficient for her sa

management, and shall see that the men placed under his orders are acquainted with their several duties and stations.

A man capable of working the motor shall be assigned to each motor boat.

The duty of seeing that the boats, pontoon rafts, and other lifesaving appliances are at all times ready for use shall be assigned to one or more officers.

LIFE PRESERVERS.

48. Every vessel inspected under the provisions of Title LII, Revised Statutes of the United States, shall be provided with one good life preserver, having the approval of the Board of Supervising Inspectors, for each and every person carried, and every vessel carrying passengers shall have in addition thereto a number of life preservers suitable for children equal to at least 10 per cent of the total number of persons carried.

Every life preserver adjustable to the body of an adult person, manufactured after February 10, 1923, shall be of the reversible type, made of suitable material approved by the Board of Supervising Inspectors, with straps properly attached on each side of the body of the life preserver (thus making it reversible), with recesses under the arms, thereby allowing the front and back sections to fit around the upper part of the wearer, and held in place by the straps, and the upper part of the life preserver shall be made vestlike, the whole so constructed as to place the main buoyant body of the device underneath the shoulders and around the body in a manner that it will support the person wearing it in an upright or a slightly backward position.

All such life preservers shall be not less than 52 inches in length when measured laid flat, and every life preserver shall be capable of sustaining for a continuous period of at least 24 hours an attached weight so arranged that whether the said weight be submerged or not there shall be a direct downward gravitation pull upon said life preserver of at least 20 pounds.

All life preservers shall be covered with uncolored material without filling or sizing, of sufficient weight and strength to fully protect the contents, such material to be unbleached cotton drill or twill of not less than 6 ounces in weight to a section of 30 by 36 inches. Such covering on the body of each life preserver shall be of one piece only, and the outside longitudinal edge of the covering seam shall be turned to a roll and closely rope stitched: *Provided*, That the material used in construction of the vestlike top may be made of separate pieces of like material of the same weight, gored to fit, and securely sewed by a double row of stitching to top of such life preserver: *Provided further*, That vivatex may be used as a cover for life preserves when such material is of a weight not less than 10.2 ounces per square yard.

The straps or other approved means of securing the life preserver about the body of the wearer shall be of double-woven cotton tape of 1¼ inches width with two selvage or cord edges, of 175 pounds tensile strength, extending along both sides of the life preserver and secured thereto in a permanent manner, so as to make such life preserver reversible, the ends of the straps extending 12 inches beyond the ends of the jacket: *Provided*, That when it becomes necessary to replace belt straps on life preservers of the single-belt type, it shall be done in the foregoing manner so as to make such repaired li preservers reversible.

All thread used in the construction of life preservers shall be of size and strength not less than Barbour's linen, three-cord, No. 2 machine thread, and any thread other than linen shall be approv by the Board of Supervising Inspectors before being permitted to used. All seams and other machine sewing on life preservers sh be with a short lock stitch, not less than eight stitches to the inch.

Cork block life preservers shall contain an aggregate weight of pounds of good cork in the body thereof, and where the blocks a made up of separate pieces, said pieces shall be fastened with no corrosive materials.

Blocks of compressed cork when used in life preservers shall weig in the aggregate not less than 5½ pounds in the body thereof, and sha be so constructed that said blocks will sustain, without disintegratio or substantial expansion, a submersion test satisfactory to th inspector examining the same, and that at the expiration of suc test shall have the buoyancy above required.

Blocks of balsa wood or sheaves of tule when used in life preserve shall fulfill the same requirements as for life preservers constructed solid or compressed cork as to construction, material in cover, strap and thread, and be subjected to similar tests for buoyancy.

The edges, corners, and outside surface of block material used in th construction of life preservers shall present a smooth surface to gua against undue destruction of the covering material and present sui able smooth surface for legible stenciling and stamping by th inspectors making the inspection.

When a kapok collar is provided, it shall be filled with prime Ja kapok, efficiently tufted, such collar filling to weigh at least ounces, and every such kapok collar shall be capable of sustaini for a continuous period of at least 48 hours an attached weight arranged that whether the weight shall be submerged or not the shall be a direct downward gravitation pull of at least eleven tim the weight of the completed collar or collar sample undergoing th test. Such kapok supporting collars and all other supporting colla shall be subjected to buoyancy test separate and independent to th of the test required for the body of the life preserver.

Every new type of life preserver submitted to the Board of Supe vising Inspectors for approval shall be accompanied by specification blue prints, or drawings, in triplicate, and no such type of life pr server shall be approved without an actual satisfactory service te being witnessed by the Board of Supervising Inspectors.

All life preservers shall be marked with the name and address the manufacturer.

After September 2, 1921, no life preserver shall be passed at th factory inspection which does not fulfill the foregoing requirement but life preservers now in use or already passed at factory inspectio may be used on board vessels, provided they are constructed accordance with the laws and regulations in force up to the date September 2, 1921, and are in good and serviceable conditio *Provided*, That life preservers that have deteriorated to the extent requiring new covers may be used upon vessels under the jurisdictio of this Service when reconstructed in a manner to conform in eve particular with the foregoing requirements.

Inspectors are required to direct such life preservers to be distributed throughout the cabins, staterooms, berths, and other places convenient for passengers on such steamers, and there shall be a *printed notice* posted in every cabin and stateroom and in conspicuous places about the deck informing passengers of the location of life preservers and of the mode of applying or adjusting the same. Life preservers on passenger, excursion, and ferry steamers when stowed overhead shall be so supported that they can be quickly released and distributed among the passengers, and the inspector shall satisfy himself as to the efficiency of the means used for such purpose by actual experiment; and when such life preservers are stowed overhead at a height greater than 7 feet from the deck below efficient means shall be provided for such immediate release and distribution to be operated by persons standing on the deck below.

The supervising inspector of the district shall detail a local or assistant inspector to any place where life preservers are manufactured, whose duty it shall be to test and examine all life preservers manufactured at that place and satisfy himself that such life preservers are in accordance with the requirements of the Board of Supervising Inspectors. When found to be in accordance with the requirements, the inspector shall stamp them with a stamp bearing the initials of his name and the date of examination and certifying that they have been examined and passed. When life preservers are so stamped, it shall be prima facie evidence that they comply with the requirements of law and regulations as to their original construction, and they may thereafter be accepted by inspectors, in their discretion, as being in accordance with the rules and regulations of the Board of Supervising Inspectors. Any life preserver of a type that has been approved by the Board of Supervising Inspectors subsequent to 1922 may be examined and passed as provided for by this paragraph after the same has had the approval of the supervising inspector of the district in which it is manufactured, and every manufacturer of such life preservers shall furnish 12 sets of blue prints or drawings and specifications to the said supervising inspector, one of which shall be forwarded to the bureau, and one to each supervising inspector.

At each annual inspection of any vessel, and oftener if deemed necessary, it shall be the duty of the inspectors making the inspection to examine and inspect all life preservers in the equipment of such vessel and satisfy themselves (or himself) that such life preservers are in accordance with the requirements of the Board of Supervising Inspectors: *Provided*, That when any block of compressed cork used in a compressed-cork type life preserver is found to be in a broken or granulated condition, such compressed-cork block shall be condemned as unfit for further use. When found to be in accordance with the requirements, the inspector shall plainly stamp them with a stamp bearing the word "Passed," his initials, the inspector's port, and the date of approval: *Provided*, That at the annual inspection of a vessel, or oftener, if necessary, at least 5 per cent of all *kapok life preservers*, or such greater number as may be deemed necessary or desirable, shall be subjected to a buoyancy test, as follows: Life preserver containing kapok as buoyant material in the body thereof, if for the use of adults, shall be subjected to a test for buoyancy by being entirely submerged for a period of two hours, after which it shall be capable of sustaining in water an attached weight having an actual downward gravitation pull of 20 pounds when the weight is submerged, and kapok life preservers with kapok collars shall subjected to a similar test, except that the attached weight sha have an actual downward gravitation pull of 28 pounds when th weight is submerged. The test for children's life preserver shall the same as the test for adult's life preserver, except the final test f buoyancy, which shall be by a submerged weight of 10 pounds for li preserver without collar and 14 pounds for life preserver with colla Any such life preserver failing to meet the required test shall be imm diately condemned and removed from the vessel's equipment, and a fu detailed report of every such failure shall be immediately forwarde to the supervising inspector of the district having jurisdiction.

Inspectors inspecting *Government vessels* upon request of an department of the Government may accept life preservers made unde the specifications of any department of the Government, and stam same with the inspector's stamp and an additional stamp bearing th legend "U. S." within a circle for identification, with the understan ing that they are not to be used except upon Government vessels an will not be allowed as any part of the equipment of vessels und the jurisdiction of this Service.

Every life preserver for the use of *children* shall be made of suitab material approved by the Board of Supervising Inspectors, capab of sustaining in water a weight of 10 pounds for a period of 24 hour and of the same general form of construction as to material an design as required for an adult life preserver.

Each life preserver shall be marked on the front compartme "Adults," if for the use of adults; and "Children," if for the use children; and if of a character suitable for the use of both adults an children it shall be so marked.

Life preservers which depend upon *inflation or air compartmen* for buoyancy, or which are constructed of *loose granulated materi* or any other material not approved by the Board of Supervisin Inspectors, shall not be allowed. Any life preserver hereaft approved by the Board of Supervising Inspectors may be accept in lieu of those specified in this section.

KAPOK LIFE PRESERVERS.

Every type of kapok life preserver used on any vessel subject inspection by this Service shall first be approved by the Board Supervising Inspectors. The life preservers receiving such approv shall conform in every respect to the sample submitted to the boar

Kapok life preservers to receive the approval of the board sha be simple in design and of a character to support the wearer in upright or slightly backward position. The life preserver shall filled with not less than 1½ pounds of prime Java kapok and shall suitably and efficiently tufted. It shall be tested for buoyancy follows:

First. At least one life preserver from each lot of 250 shall be s lected indiscriminately by an inspector of this Service for buoyancy tes

Second. The life preserver shall be submerged in a tank of fres water for a period of 48 hours.

Third. The life preserver shall then support in fresh water submerged weight of 20 pounds for a period of 24 hours. Whenev life preservers contain more than 1½ pounds of kapok in the bod thereof the buoyant test shall be made in the ratio of 20 pounds each 1½ pounds of kapok.

When a kapok collar is provided it shall be filled with prime Java kapok, efficiently tufted, such collar filling to weigh at least 10 ounces, and every such kapok collar shall be capable of sustaining for a continuous period of at least 48 hours an attached weight so arranged that whether the weight shall be submerged or not there shall be a direct downward gravitation pull of at least 11 times the weight of the completed collar or collar sample undergoing the test. Such kapok supporting collars and all other supporting collars shall be subjected to a buoyancy test separate and independent to that of the test required for the body of the life preserver.

All approved kapok life preservers shall be marked with the name and address of the manufacturer. Each life preserver shall be marked on the front compartment "Adults," if for the use of adults; and "Children," if for the use of children; and if of a character suitable for the use of both adults and children it shall be so marked.

For each lot of 250 life preservers the manufacturer shall submit to the local inspectors of the district in which manufactured an affidavit setting forth the material with which the life preservers are filled and that the life preservers meet in every respect the requirements of the General Rules and Regulations of the Board of Supervising Inspectors. Every life preserver meeting the above requirements shall be inspected by an inspector of this Service and stamped with his initials and the date of inspection. (Sec. 4488, R. S.)

RING LIFE BUOYS.

49. The minimum number of life buoys with which vessels are to be provided is fixed as follows:

Vessels under 100 feet in length, minimum number of buoys, 2; vessels 100 feet and less than 200 feet in length, minimum number of buoys, 4, of which 2 shall be luminous; vessels 200 feet and less than 300 feet in length, minimum number of buoys, 6, of which 2 shall be luminous; vessels 300 feet and less than 400 feet in length, minimum number of buoys, 12, of which 4 shall be luminous; vessels 400 feet and less than 600 feet in length, minimum number of buoys, 18, of which 9 shall be luminous; vessels 600 feet and less than 800 feet in length, minimum number of buoys, 24, of which 12 shall be luminous; vessels 800 feet and over in length, minimum number of buoys, 30, of which 15 shall be luminous.

Ring life buoys shall be of solid cork or any other equivalent material, shall be of not less than 30 inches outside diameter and not less than 17 inches inside diameter, and shall be capable of sustaining in fresh water for a continuous period of 24 hours an attached weight so arranged that, whether said weight be submerged or not, there shall be a direct downward gravitation pull upon the buoy of not less than 31 pounds. The body of the buoy before being covered shall stand a downward gravity pull of 200 pounds, the weight to be attached to the buoy body by a sling covering a surface of 2 linear inches, without breaking, without rupture of the joints, or without showing a maximum elongation of internal diameter in excess of 1½ inches while the weight is attached after being under this test for a period of 30 minutes.

The buoy shall be covered with cloth of sufficient weight and strength to fully protect the body of the buoy. Such material shall be of a strength equivalent to an unbleached single-filling cott duck having a weight of 8 ounces to a section 36 by 36 inches.

The cover shall be constructed and placed on the body of the bu in a substantial manner. All seams and other machine sewing on t buoy shall be with a short lock stitch not less than eight stitches the inch. The inside seam shall be sewed with a rope stitch not l than three stitches to the inch.

Four beckets 2½ inches wide, made from the same material as t covering of the buoy, shall be securely attached to the buoy a spaced an equal distance from each other. A line shall pass throu the beckets, which shall be sewed tightly together to prevent slippi The line shall be manila, three-eighths inch in diameter, three-p medium lay, of good quality, having the ends securely and nea spliced, the line to be festooned in bights around the outer edge the buoy. All thread used in the construction of the buoy shall No. 16, three-cord linen.

When the buoy is made of cork, the cork form shall be construct of sound, buoyant corkwood, in two layers or thicknesses. The co sheets shall be flattened and smoothed so that the back or outsi hard crust is removed sufficiently to give a smooth surface for glui One layer shall be built of segments not to exceed four in numb The other layer may be built of segments not to exceed eight number. The ends of all segments shall be fitted neatly and glu securely one to the other. The two layers shall be neatly join and properly and securely dowel-pinned and glued firmly togeth with joints staggered or broken. The glue used shall be insolu in water, and the finished buoy shall stand steaming at a pressu of 2 pounds for a period of 30 minutes without disintegration other positive indications of the glue losing its adhesive properti When completed, the outside of the buoy shall be of good, sou corkwood finished to a smooth surface. Any form of constructi which will meet the general purposes of the above specifications a requirements may be used after having been approved by the Boa of Supervising Inspectors.

The supervising inspector of the district shall detail a local assistant inspector to any place where cork ring life buoys are man factured within his district, whose duty it shall be to test and exami all such buoys manufactured at that place. When a cork ring l buoy is found to be in accordance with the requirements of the ru of the Board of Supervising Inspectors, the inspector shall stamp t cork, and, after completion of the buoy, shall stamp the cover w the word "Passed," his initials, the inspection port, and the date approval. The cork and the cover shall also be stamped by t manufacturer with the name or trade-mark of the manufacturer.

Balsa-wood A B C ring life buoys shall be constructed of good, fre sound balsa wood and shall be made in two layers with not m than four pieces in each layer, the same to be properly and secur dowel-pinned, and shall be of not less than 30 inches outside dia eter and not less than 17 inches inside diameter, and of suffici buoyancy to sustain the specified weight and give the buoyan required, and shall be covered with the same weight canvas, stitch roped, and marked or stamped as required by the specifications cork ring life buoys.

The use of kapok, rushes, cork shavings, granulated cork, or any other loose granulated material, or compartments which depend on nflation for their buoyancy, is not allowed in the manufacture of ring life buoys.

Ring life buoys shall not be permanently secured in any way, but shall be so placed as to be readily accessible in an emergency. Their location shall be plainly indicated.

One of the buoys on each side of the vessel shall have a life line attached of at least 15 fathoms in length.

Luminous buoys are those having attached an efficient self-igniting light which can not be extinguished in water.

SELF-IGNITING WATER LIGHTS.

50. The self-igniting water lights for ring buoys and life rafts shall consist of a cylinder (with bumped heads or ends) made of good sheet copper of not less than 0.022 inch thick, and shall be so designed as to be nonexplosive, and shall be free from any defects which may affect the serviceability or operation of the light. The cylinder shall be sufficiently weighted in the bottom to recover and maintain an upright position in the water, and all circumferential and horizontal seams of the cylinder shall be hook jointed and soldered, and the top circumferential seam shall be flush, so as to prevent the lodgment of water.

The cylinder shall be provided with a plug or other device of such character that when removed from the cylinder sufficient water will be admitted to insure the prompt and efficient action of the light, regardless of whether the cylinder when first striking the water becomes completely submerged.

The removal of the plug or device shall be effected by the operation of a lanyard attached to the buoy and to the plug or device on the cylinder, and shall be so arranged and constructed that the weight of the buoy when thrown overboard will automatically disengage the plug or device, and will insure that the light will self-ignite within one minute after reaching the surface of the water: *Provided*, That on oil-tank steamers the self-igniting water light need not be attached to the ring buoy, but may be placed alongside the buoy which it is intended to serve, so that it can be easily and quickly attached to the buoy by means of its lanyard when needed in case of emergency.

On oil-tank steamers, when self-igniting water lights are not attached to the ring buoys, a snap hook shall be provided for this purpose.

The cylinder shall contain calcium carbide (taken from fresh stock entirely free from the white powdery substance resulting from exposure to the air) and calcium phosphide sufficient to create a brilliant flame of at least 150 candlepower, which shall be maintained and burn for a continuous period of not less than 45 minutes without emitting obnoxious fumes. If at any time during this period the flame is extinguished, due to the total submersion of the light, the light shall self-ignite upon coming to the surface.

The self-igniting water lights required for life rafts shall meet the above requirements, except that the plug or device may be removed by manual action instead of by the automatic action of the buoy lanyard above referred to.

The cylinder shall be plainly marked with the word “TOP” its top end and permanently indented or embossed with the nar and address of the manufacturer, the year of manufacture (the u of labels of any description for this purpose is strictly forbidder and with the statement that the device meets in every way t requirements of the Board of Supervising Inspectors.

On and after July 1, 1924, no type or make of water light will approved which has not been tested by the Bureau of Standarc Department of Commerce, and found to conform in all respects these requirements.

These rules for water lights shall be effective on and after July 1924: *Provided*, That water lights manufactured before April 1924, and installed on vessels previous to the application of t present requirements will be allowed to remain in service so long they are maintained in good and serviceable condition; and i spectors, when inspecting vessels having such water light equipmen shall give especial attention to the condition of the water lights, ar if there appears any evidence whatsoever of corrosion, such as bli ters and warts under the paint, or where the can is badly abrais by hard usage or carelessness, the same shall be condemned at on and new water lights of an approved type substituted for the ones condemned, and the attention of the officers of the vessel shall th be called to the necessity for greater care to be exercised in the prese vation of the equipment, and it shall be made clear to them that th will be held strictly accountable to this service for the condition the same.

FLASH LIGHTS AND BATTERIES FOR LIFEBOATS.

51. The flash lights for lifeboats shall be of all metal, rugg construction, of focusing type with a reflector head of about 2 inch in diameter. The reflector shall have a true parabolic surfa coated with a heavy silver polished plate, free from mars and den and protected by a coat of clear lacquer. The flash light shall provided with two extra lamps, and all external parts of the fla light shall be protected by a heavy nickel plating or a black baked- lacquer or enamel.

The flash-light batteries shall be of the sal ammoniac type wi depolarizer. They shall have a nonspillable electrolyte and be fi from leakage during the useful life of the cell. They shall be of t tubular construction, comprising three cells assembled in line, e to end in a suitable close fitting tube or jacket of news, chip, strawboard. The brass cap on the carbon rod and the zinc botto of the cell shall serve as the terminals. The batteries shall be mark with the “trade name of the cell, the name of the manufacturer trademark number, or other designations of size, the date of man facture, and the date of expiration of a guarantee period for *U. Marine Service.*” Local or assistant inspectors making annual i spections or reinspections shall satisfy themselves that such flas light equipments are in condition to warrant the belief that sar are efficient for emergency use between the date of such inspecti and the next following inspection or reinspection date. The b teries, however, shall not be continued in use for lifeboat equi ment for a period exceeding one year from date of manufacture.

The flash-light batteries allowed under this specification shall be of a quality to meet the United States Bureau of Standards tests as to voltage, capacity, delayed service tests, and required performance. (Secs. 4405, 4417, 4491, R. S.)

DISTRESS LIGHTS.

52. Distress lights required to be used in lifeboat and life raft equipment shall have a burning capacity of not less than two minutes and to give forth a brilliant red flame of not less than 500 candlepower, signals to be treated and made impervious to moisture, the container to be constructed of 18-ounce or No. 22 B. W. G. copper or equal noncorrosive metal, lock jointed and soldered, bottom to be rolled in and soldered, cover or top to be made of cast brass not less than one-eighth of an inch thick and 5 inches in diameter, to fit down on rubber gasket to make container water-tight. The cover shall be so constructed as to be easily removed: *Provided*, That a container of the same material and construction, with a cover of not less than 3 inches in diameter, may be used on life rafts.

LINE-CARRYING GUNS AND EQUIPMENT.

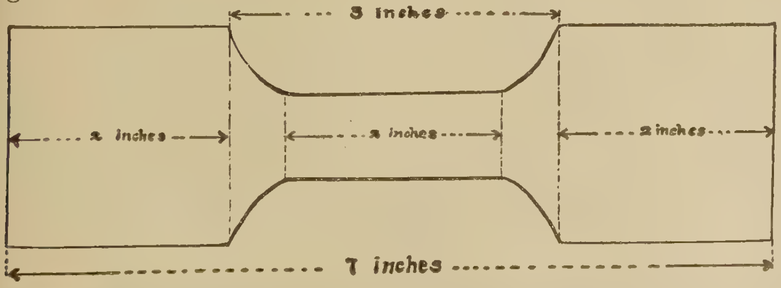
53. All steam vessels of 150 gross tons and over navigating the ocean shall be equipped with at least three line-carrying projectiles and the means of propelling them, of a type and character which have been officially approved by the Board of Supervising Inspectors. (Sec. 4488, R. S.)

ALLOY OF LYLE-TYPE GUNS.

54. The material entering into the construction of cast-bronze guns for use on board steam vessels as a means of propelling line-carrying projectiles shall have a tensile strength of not less than 52,000 pounds per square inch of section and a reduction of area of not less than 25 per cent. (Sec. 4488, R. S.)

SAMPLE OF GUN FOR TESTING.

55. At least one sample of the material shall be taken from the casting of each gun, and shall be not less than 7 inches in length, 2 inches in width, one-half inch in thickness, and have a section 0.5 by 0.75 inch over a length of 2 inches, according to the following diagram:



The samples for testing shall be furnished the supervising inspector of the district where the gun is to be tested and shall be accompanied by an affidavit of the manufacturer of the gun that the samples actually and correctly represent the material of the gun. The samples shall be distinctly marked with the same number appearing

on guns which they represent, so as to be readily identified by th
inspector. (Sec. 4488, R. S.)

FIRING TEST OF LYLE AND HUNT GUNS.

56. All line-carrying guns of the cannon type shall be tested i
the presence of an inspector by firing three rounds from the gu
One round at least shall carry the regular service projectile, with
service line attached, a distance of at least 1,400 feet without break
ing or fouling the line, the performance to be based upon the cond
tions of a reasonably still atmosphere. The other rounds shall b
fired with not less than the same weight of powder charge, one o
which shall be not less than a weight of 8 ounces, and with projectile
of the same weight as the service projectile, but no line need b
attached: *Provided*, That the distance requirement for the Hun
line-carrying gun, small, shall be only 800 feet.

The primer hole fitted in the upper wall of all guns of the canno
type manufactured after June 30, 1920, shall be protected by
beading, coaming, or projection extending above the wall of the gu
not less than one-half inch.

The test rounds required shall be fired from the gun when mounte
on its own carriage, lashed as it would be in shipboard use, and whe
this test is completed, the gun and its mounting shall show n
signs of fracture or damage.

The line shall be coiled, faked, or reeled in its own faking box o
reel in such manner that when all the line leaves the container it sha
automatically become unattached and free from the containe
The end of the line intended to be attached to the projectile sha
have securely attached thereto a substantial tag bearing a permanen
legend which shall indicate its purpose and the other end of the lin
shall be tagged in the same manner in order that there may be n
delay in securing proper and immediate action of the equipmen
and the gun, carriage, line box or reel, and projectiles shall all bea
the same number and shall be initialed by the inspector, whos
report of the test, giving number, date, and result, shall be filed i
the office of the supervising inspector of the district in which the tes
is made. (Secs. 4405, 4488, R. S.)

STEEL GUNS.

57. Before any steel gun of the cannon type shall be approve
the manufacturer shall furnish the supervising inspector of th
district where the gun is tested a sample of the material of which it i
constructed, such sample to be of the following dimensions: Seve
inches in length and approximately 1½ inches wide and 1 inch thick
with a section 2½ inches in the center turned down to ½-inch diamete
the sample to be accompanied by the same form of affidavit a
required for bronze guns. The sample shall show a tensile strengt
of not less than 65,000 pounds per square inch of section and a
elongation of not less than 20 per cent in a length of 2½ inches. (Se
4488, R. S.)

AUXILIARY LINES AND PROJECTILES.

58. All steamers required under the law to carry line-carryin
projectiles, and the means of propelling them, shall be supplied auxi
iary thereto with at least 800 feet of 3-inch manila line for vessels o
over 150 and not over 500 gross tons, and 1,500 feet of such line fo

steamers over 500 gross tons, and with three approved service lines and three projectiles. The auxiliary line and all other equipment shall be kept always easily and immediately accessible and ready for use in connection with the gun and shall not be used for any other purpose. (Sec. 4488, R. S.)

SHOULDER GUN.

59. The gun known as the "shoulder gun" may be used on steamers of 300 tons and under as a means of propelling a line-carrying projectile. This gun is an ordinary breech-loading rifle with barrel shortened and bore smoothed, using a blank cartridge of 45–70 or 50–70, propelling a projectile about 8 inches long weighing about 8 ounces, attached to a line not less than 400 feet in length.

The projectile shall be thrown a distance of not less than 250 feet, without fouling or breaking the line. The gun shall be of a type approved by the Steamboat Inspection Service. The manufacturer of the gun shall furnish purchasers with an affidavit that it is of approved type, of safe material, and good workmanship. Each shoulder gun shall be provided with three shot lines, 10 projectiles, at least 25 cartridges, and the other necessary equipment. Each vessel using the shoulder gun shall carry auxiliary thereto, to be used for no other purpose, at least 500 feet of 3-inch manila line. (Sec. 4488, R. S.)

SERVICE PROJECTILE LINES AND PROJECTILES.

60. Service projectile lines shall approximate in size the line used by the United States Coast Guard and shall be not less than 1,700 feet in length, made in one continuous length without splice, knot, or other retarding feature, and shall be capable of withstanding a breaking strain of 500 pounds.

The purchaser of service lines shall be furnished a statement by the dealer or manufacturer that, based upon the test of a sample from each end of the line, it is of the required strength and that the line has been examined over its entire length and found to be without splice, knot, or other defective feature. A copy of such statement shall be furnished by the purchaser or dealer to the supervising inspector of the district in which the gun and line are tested.

The container of the line shall bear the name of the manufacturer or dealer, together with the statement that the line in all respects meets the requirements of the Steamboat Inspection Service.

The projectiles shall weigh not less than 18 pounds, be smoothly turned and finished, with a windage of not more than one sixty-fourth of an inch. No such projectile or means of propelling it shall hereafter be approved unless of such a character that the projectile and propelling charge can be readily withdrawn from the gun when it becomes necessary or desirable to do so. Powder containers of center-fire type shall be of such construction that proper alignment of firing pin and percussion primer always obtains when propelling charge and projectile are set for use. When perforated metal powder containers are used, such perforations shall extend entirely around the base of such containers, and at least 25 efficient primers shall be carried for the firing thereof.

It is recommended that the charge of powder in actual service on shipboard shall be from 5 to 6 ounces, but may be exceeded under extraordinary circumstances, and in no case shall the charge exceed

8 ounces. The end of the line attached to the projectile should b thoroughly wet for a length of about 1 fathom. (Sec. 4488, R. S.

REPORT OF TEST OF GUN.

61. The supervising inspector shall furnish the manufacturer o any line-carrying gun a copy of the report on each gun tested an inspected. (Sec. 4405, R. S.)

DRILL REQUIRED WITH LINE-CARRYING GUN.

62. The master of every vessel equipped with a line-carrying gu shall drill his crew in the use thereof and fire said gun at least onc in every three months, using one-half the usual charge of powde and any ordinary line of proper length.

It shall be the duty of the inspectors, at the annual inspection, t see that these drills are entered on the log of the vessels. (Sec. 440 R. S.)

PLACARD CONTAINING INSTRUCTIONS FOR USE OF GUN APPARATUS.

63. A placard containing instructions for using the gun apparatu required by the foregoing section and as practiced by the Unite States Coast Guard shall be posted in the pilot house, engine roo and in the seamen's, firemen's, and steward's department of ever steam vessel required by law to carry such gun apparatus. (Se 4405, R. S.)

EXTRA STEERING APPARATUS, LADDERS, STAIRWAYS.

64. Extra steering apparatus consisting of relieving tackles o tiller shall be provided for all steamers: *Provided, however,* Tha where a steamer is equipped with auxiliary steam or hand steerin gear attached to rudder entirely independent of the regular steerin gear, same may be used in lieu of the relieving tackles or tille required.

Every steamer or barge carrying passengers shall be provide with suitable ladders to enable passengers to descend convenientl to the lifeboats and life rafts. One of such ladders shall be provide for each set of boat davits, and kept ready and convenient for us on the boat deck, and shall be long enough to reach from such dec to the vessel's seagoing light water line. All such ladders shall b reversible and free from projections in order that the garments c descending or ascending persons will not become entangled in the

Every steam vessel shall be provided with sufficient means c escape from the lower to the upper deck, or vice versa, and ever steamer of 50 tons or over carrying passengers shall be provided wit permanent stairways forward and aft, except where said stairwa on towing boats would interfere with towing bitts. (Secs. 4405, 448 4484, R. S.)

BULKHEADS.

65. Every seagoing steam vessel constructed after July 1, 191 carrying passengers, shall have a water-tight collision bulkhead. I vessels not over 200 feet in length this bulkhead shall be located abo one-tenth the vessel's length from stem. In vessels over 200 and n over 350 feet in length the collision bulkhead shall be located abo one-twelfth the vessel's length abaft the stem. In vessels over 35

and not over 500 feet in length it shall be located about one-fifteenth the vessel's length abaft the stem, and in vessels over 500 feet in length, about one-sixteenth the vessel's length abaft the stem. Such vessels shall also have one water-tight bulkhead forward of and one abaft the engine and boilers, and in addition thereto shall have such other water-tight bulkheads as may be necessary to provide that there shall be no space between the bulkheads to exceed in length one-fifth the length of the vessel: *Provided, however*, That in no case shall the distance between the bulkheads be greater than 80 feet.

Screw steamers shall, in addition to the above-named bulkheads, have located at a suitable distance forward from sternpost a water-tight bulkhead to protect vessel from disaster in case of fracture of stern pipe.

Sailing vessels of over 700 tons carrying passengers for hire shall have a water-tight collision bulkhead. Such collision bulkhead shall be placed not less than 5 feet from the stem of the vessel.

Wooden steamers carrying passengers whose cargo is restricted to lumber exclusively shall only be required to have a water-tight collision bulkhead as described in the first paragraph of this section; also one water-tight bulkhead forward of and abaft the engines and boilers.

All such bulkheads shall be of iron or steel plates not less than one-fourth inch thick and shall be securely fastened to suitable framework, which framework shall be properly and securely attached to the hull. Such bulkheads shall be strengthened by vertical bars of not less than $3\frac{1}{2}$ by $3\frac{1}{2}$ inch angle iron, spaced not more than 30 inches from center to center, and all steamers that are more than 10 feet deep in any hold shall have horizontal angle irons of not less than 3 by 3 inches on the reverse side, spaced not more than 4 feet from center to center, in addition to the vertical angle irons: *Provided*, That when any bulkheads are constructed of equal strength to the above-described bulkheads they shall be allowed by the local inspectors.

All bulkheads shall reach to the main deck in single-decked vessels, otherwise to the deck next below the main deck, but in every case they shall reach to the deck next above the deep-load line.[2] (Sec. 4490, R. S.)

MEANS OF ESCAPE FROM STEAMERS.

66. On all steamers where the plans and arrangements will possibly permit, all inclosures where passengers or crews may be quartered, or where anyone may be employed, shall be provided with not less than two avenues of escape, so located that if one of such avenues is not available another may be. The locality and arrangement of such additional means of escape shall be determined by the steamboat inspectors and the steamboat managers as will in their judgment best carry out the purposes for which this provision was made. (Sec. 4417, R. S.)

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[2] SEC. 3. That steam vessels of one hundred tons burden or under engaged in the coastwise bays and harbors of the United States may be licensed by the United States local inspectors of steam vessels to carry passengers or excursions on the ocean or upon the Great Lakes of the North or Northwest, not exceeding fifteen miles from the mouth of such bays or harbors, without being required to have the three water-tight cross bulkheads provided by section forty-four hundred and ninety of the Revised Statutes for other passenger steamers: *Provided*, That in the judgment of the local inspectors such steamers shall be safe and suitable for such navigation without danger to human life and that they shall have one water-tight collision bulkhead not less than five feet abaft the stem of said steamer. (Act approved July 9, 1886.)

STORM OIL.

67. On and after January 1, 1915, coastwise vessels of more tha 200 gross tons propelled by machinery and navigating the oceans c gulfs shall carry a supply of oil for the purpose of smoothing th sea or quelling the force of the waves in case of emergency or necessity in the following quantities:

Vessels of over 200 and not over 1,000 gross tons, 30 gallons.
Vessels of over 1,000 and not over 3,000 gross tons, 40 gallons.
Vessels of over 3,000 and not over 5,000 gross tons, 50 gallons.
Vessels of over 5,000 gross tons shall carry at least 100 gallons.

This oil shall be accessible and available at all times and the location of the supply and the means and methods of its distribution sha be determined by the master of the vessel. (Sec. 4405, 4417, R. S.

STEAMER'S NAME ON EQUIPMENTS.

68. All the equipments of a steamer, such as buckets, hose, axe boats, oars, rafts, life preservers, floats, barrels, and tanks, shall b painted or branded with the name of the steamer upon which the are used. (Sec. 4405, R. S.)

OCEAN AND COASTWISE.

RULE IV.—FIRE APPARATUS.

1. All steamers navigating oceans are required to be provided wit fire buckets and axes, as follows:

Gross tons.	Buckets.	Axes.
All steamers not over 10 tons	2	
All steamers over 10 tons and not over 50 tons	4	
All steamers over 50 tons and not over 200 tons	8	
All steamers over 200 tons and not over 500 tons	16	
All steamers over 500 tons and not over 1,000 tons	20	
All steamers over 1,000 tons	25	

Fire buckets shall be of a capacity of not less than 3 gallons eac but where buckets already installed are of a capacity of less than gallons each they may continue to be used, and fire buckets of th standard size shall be added to provide the total capacity require

Not more than six of the buckets required by this table shall b carried on the upper or boat deck.

Fire buckets shall, when practicable, be constantly filled wit water and in such positions on board as shall be most convenie for extinguishment of fire. (Secs. 4426, 4483, R. S.)

2. All axes shall be located so as to be readily found in time of nee shall not be used for general purposes, and shall be kept in good cond tion. (Secs. 4426, 4483, R. S.)

3. All hay, straw, or other inflammable material carried on th open deck of any steamer carrying passengers shall be covered wit a tarpaulin.

All baled cotton shall be securely bound and covered with baggin on at least three-fourths of its surface, including both ends of th bale. No bales of imported or domestic hemp shall be received o any vessel carrying passengers unless the same are properly compressed, bound with rope, wire, or metallic bands, and covered on ends or sides, according to the several methods now practiced in foreign and domestic trade. (Sec. 4472, R. S.)

4. The main pipes and their branches, on steamers carrying passengers or freight, to convey steam from the boilers to the hold and separate compartments of the same shall be not less than 1½ inches in diameter. Steam pipes of not less than three-fourths of an inch in diameter shall be led to all lamp lockers, oil rooms, and like compartments, which lamp lockers, oil rooms, and compartments, in all classes of vessels, shall be wholly and tightly lined with metal. All branch pipes leading into the several compartments of the hold of the vessel shall be supplied with valves, the handles distinctly marked to indicate the compartment or parts of the vessel to which they lead.

These valves or their handles shall be placed in not more than two places on the most suitable and accessible deck of the vessel and so arranged that all can be inclosed in cabinets, boxes, or casings, the doors of which shall be plainly marked with the words "Steam fire apparatus."

On all oil-tank steamers the valves, instead of being located near the hatches on the upper deck, shall be all in an accessible house in which the operator is well protected from heat and smoke: *Provided*, That on oil-tank steamers a main line of steam smothering pipe of sufficient area to supply all branch pipes leading from the same to the tanks may be run the entire length of the deck, and only the main stop valve of the main line shall be required to be housed. All branch pipes shall be provided with valves which shall be left open at all times, so that the steam may enter all compartments simultaneously. Such branches as may not be required after the fire is definitely located may be shut off, in order that the entire system may be concentrated on one tank.

Provided, That carbonic-acid gas or other extinguishing gases or vapors may be substituted in place of steam as aforesaid and for the above-described purposes, and may be used on cargo vessels, using oil for fuel, in the fire hold, fire-room bilges, and pump rooms, when such gas or vapor and the apparatus for storing, producing, and distributing same shall have been approved by the Board of Supervising Inspectors.

On all vessels where a carbon dioxide system is installed, there shall be sufficient carbon dioxide to provide a 30 per cent concentration in the largest cargo hold.

Provided further, That pipes for conveying steam from the boilers, or pipes for conveying carbonic-acid gas or other extinguishing vapors for the purpose of extinguishing fire, shall not be led into the cabins or into other passengers' or crew's quarters.

Provided further, That in the compartments or oil tanks of oil-tank vessels the foam-type fire-extinguishing system may be substituted for steam, or other extinguishing gases or vapors, and may also be used in the fire hold, fire-room bilges, and pump rooms on vessels using oil for fuel when such foam-type fire-extinguishing system is completely installed in accordance with drawings or blue prints and specifications approved by the supervising inspector of the district where it is installed. The foregoing system may be of a type employing either two-solution tanks or one or more generators using an approved d chemical mixture.

Any special type of appliance, fire-extinguishing medium, c arrangement approved by the Board of Supervising Inspectors ma be used.

Motor vessels of 50 gross tons and over, carrying passengers c freight for hire, shall be equipped with efficient means for exti guishing fire in the hold and the different compartments there in which cargo is carried; also in lamp lockers, oil rooms, and li compartments.

The use of glass lamps shall be prohibited on any vessel und the jurisdiction of the Steamboat Inspection Service unless the sam are securely fitted into suitable metal brackets. (Sec. 4470, R. S

5. Steamers required to be provided with double-acting steam fi pumps or other equivalents for throwing water shall be equippe with such pumps according to their tonnage, as follows: Steame over 20 tons and not exceeding 150 gross tons shall have not le than 50 cubic inches pump-cylinder capacity. Steamers of over 15 gross tons and under 3,000 tons shall have not less than one-thi of 1 cubic inch pump-cylinder capacity for every gross ton. Steame of 3,000 gross tons and over shall have pump cylinder of not le than 1,000 cubic inches capacity. This rule shall apply only t pumps installed after June 30, 1907, and all pumps now approve and in use or installed before said date shall be accepted if compl ing with requirements of law and regulations in force at the time the adoption of this rule.

Upon such steamers fire mains shall be led from the pumps to a decks, with sufficient number of outlets arranged so that any part the steamer can be reached with water with the full capacity of t pumps and by means of a single 50-foot length of hose from at lea one of said outlets. On all classes of steamers every such pump sha be fitted with a gauge and a relief valve of such size as to restrict t pressure of water to 100 pounds per square inch. (Sec. 4471, R. S

6. Steamers are not restricted to any particular proportions f fire pumps. Any dimensions that will attain the requirements spec fied in section 5, or greater in capacity, may be allowed: *Provide however,* That all hydrant connections be supplied with suitab spanners. (Sec. 4471, R. S.)

7. The capacity of the pipes and hose leading from the pum shall in no case be less than that of the discharge opening of t pump: *Provided, however,* That the pipe and hose shall in no instan be less than 1½ inches in internal diameter.

And provided further, That steamers of 15 tons and under may allowed to use hose of three-fourths of an inch internal diameter, b in no case shall it be less than the discharge opening of the pumps, being further provided that open boats of less than 10 gross to that are fully equipped with buckets, as required by these rules a regulations, shall not be required to carry hose. (Sec. 4471, R. S

8. A rotary pump, when driven by an engine independent of t main engine, may be considered as an equivalent for the doubl acting fire pump and used as such when equal to it in efficiency a capacity. (Sec. 4471, R. S.)

9. Any steamer having on board an independent steam pump a an auxiliary boiler suitably arranged and of sufficient strength a

apacity for testing the boilers thereof; or if one of the hand fire umps be suitably arranged and of sufficient strength and capacity or testing the boilers; or if the "doctor," so called, when arranged ermanently for testing the boilers, is, in the judgment of the inspecors, suitable for the purposes intended, may be considered as having omplied with the law requiring a pump for testing boilers. (Sec. 471, R. S.)

10. Any steamer of 50 gross tons or under, required to have a louble-acting steam fire pump, and having in use on board a "doctor," o called, may be considered as having a lawful equivalent for such pump when such "doctor" has pipes attached to it leading to the pper and between decks, such pipes being provided with hose and alves, according to law; but the pipes and hose shall in no case be ess than 1½ inches in internal diameter. The pumps for supplying he boilers shall in no case be considered as an equivalent for the louble-acting steam fire pump, on steamers above 50 gross tons. Every steamer exceeding 150 gross tons and not otherwise provided or shall be provided with one good double-acting fire pump to be worked by hand: *Provided,* That when a steam pump is equipped to work by hand the same shall be accepted as a hand fire pump. Each hamber shall be of sufficient capacity and the stroke so regulated hat not less than 100 cubic inches of water shall be displaced by each troke of the piston. Two smaller pumps may be allowed to take the lace of the one pump of 100 cubic inches capacity provided for in his section when their combined capacity equals or exceeds 100 cubic nches. Each pump shall be placed in the most suitable part of the essel for efficient service, having suitable, well-fitted hose to such ump long enough to reach to all parts of the vessel. Pumps may be onnected to a pipe line having sufficient number of outlets so arranged that any part of the vessel can be reached with water by means of a single 50-foot length of hose from at least one of said utlets, pumps to be kept at all times in perfect order, with brakes, nd hose coupled on ready for immediate use: *Provided,* That on reight steamers having hulls constructed entirely of metal only such ose shall be required as may be necessary to reach all cabins or supertructures, such hose to be coupled on at all times. (Sec. 4471, R. S.)

11. All steam fire pumps required shall be supplied with connect-ng pipes leading to the hold of the vessel with stopcocks or shut-off alves attached and so arranged that such pumps may be used for umping and discharging water overboard from the hold.

Each and every steam vessel shall be fitted with a bilge pipe lead-ng from each compartment of the vessel and connecting with a suit-bly marked valve to the main bilge pump in the engine room, and ach compartment of all steam vessels shall be fitted with suitable ounding pipe, the opening of which shall be accessible at all times, xcept that in compartments accessible at all times for examination o sounding tubes are necessary.

Steam siphons may be substituted in each compartment for the ilge pipes.

All hose required on steam vessels for fire purposes shall be tested o a pressure of 100 pounds to the square inch at each inspection, and t shall be the duty of the local inspectors at each annual inspection o see that the couplings are securely fastened to the hose by suitable xternal or internal clamps, and at least one length of such hose shall be kept at all times attached to each outlet of the fire main and pr vided with a suitable nozzle: *Provided,* That on freight steame where the keeping of such hose coupled on interferes with the loadi or unloading of cargo they may be removed during such loading unloading. (Sec. 4471, R. S.)

12. All pipes used as mains for conducting water from fire pum on board steam vessels in place of hose shall be of wrought iro brass, or copper, with wrought-iron, brass, or composition ho connections.

Suction pipes for all pumps on steam vessels shall be so arranged to have an area of opening sufficiently large to supply water wh pumps are working at full capacity.

Motor vessels of 50 gross tons and over, carrying passengers f hire, shall be equipped with pumps for throwing water according the tonnage as prescribed in section 5, Rule IV, for steam vesse and equipped as prescribed in the second paragraph of section 5, ar sections 6 and 7 of Rule IV. (Secs. 4426 and 4471, R. S.)

PORTABLE FIRE EXTINGUISHERS.

13. All vessels of more than 15 tons, carrying passengers, inclu ing pleasure vessels, shall be provided with such number of go and efficient portable fire extinguishers, approved by the Board Supervising Inspectors, as shall hereafter be prescribed, viz:

	Minimum numbe fire extinguisher
Vessels of over 15 and not over 50 gross tons	
Vessels of over 50 and not over 100 gross tons	
Vessels of over 100 and not over 500 gross tons	
Vessels of over 500 and not over 1,000 gross tons	
Vessels of over 1,000 gross tons	

Freight and towing vessels of over 15 gross tons having hull co structed of metal with metal superstructure shall be provided wi chemical fire extinguishers as hereinafter described, viz:

	Minimum numbe fire extinguisher
Vessels of over 15 and not over 100 gross tons	
Vessels of over 100 and not over 300 gross tons	
Vessels of over 300 gross tons	

Freight and towing vessels of over 15 gross tons constructed wood or hull constructed of metal with wood superstructure shall provided with chemical fire extinguishers as hereinafter describe viz:

	Minimum numbe fire extinguisher
Vessels of over 15 and not over 75 gross tons	
Vessels of over 75 and not over 200 gross tons	
Vessels of over 200 and not over 500 gross tons	
Vessels of over 500 gross tons	

The above tables of required fire extinguishers are based on t capacity of the ordinary machine, which is about 2½ gallons, and fire extinguisher of larger capacity shall be allowed a greater rati than that of the ordinary machine. Fire extinguishers of approv types of less capacity are allowable under the above tables when the total contents equal the required quantity.

All vessels carrying passengers which transport automobiles motor vehicles the motive power of which is generated by any of t roducts of petroleum or other inflammable liquids shall carry, in ddition to the chemical fire extinguishers required by the preceding able for vessels carrying passengers, an approved carbon dioxide, oam type or carbon tetrachloride fire extinguisher which has demontrated a capacity for extinguishing burning oils, burning gasoline, nd other burning products of petroleum, in accordance with the ollowing table:

utomobiles or motor vehicles carried:	Carbon dioxide or foam-type fire extinguishers.		Carbon tetrachloride fire extinguishers.
1 and not over 5	1	or	4
6 and not over 10	2		5
11 and not over 20	3		6
21 and not over 30	4		8
31 and not over 40	5		10
41 and not over 50	6		12

For each additional 20 automobiles or motor vehicles, or fraction thereof, add carbon dioxide or 1 foam or 2 carbon tetrachloride.

These requirements may be reduced to 25 per cent, but not less han one of either, when an efficient overhead water sprinkling system, carbon dioxide, or a foam system with sufficient hose to reach all arts of the deck where automobiles or motor vehicles are carried is nstalled, said systems to be installed in accordance with drawings or lue prints and specifications approved by the supervising inspector f the district having original jurisdiction.

When a vessel is provided with enough fire extinguishers to take are of all the automobiles or motor vehicles that can be carried, no xtra fire extinguishers shall be required for any number of motor ycles carried.

Extra safety-valve units shall be carried on board for 50 per cent f hand fire extinguishers of the foam type, and extra charges shall e carried on board for 50 per cent of each class of fire extinguishers rovided. If 50 per cent of each class of fire extinguishers carried ives a fractional result, extra charges and extra safety-valve units hall be provided for the next largest whole number.

Example.

Fire extinguishers carried.	Extra charges required.
1	1
2	1
3	2
4	2
5	3

There shall also be carried on board a complete recharge for any ixed or built-in fire-extinguishing system that has been approved by he Board of Supervising Inspectors, except systems for engine rooms, ire rooms, and cargo holds.

Fire extinguishers shall be located in such parts of the vessels as n the judgment of the local inspectors will be most convenient and erviceable in case of emergency, and so arranged that they may be asily removed from their fastenings. Every fire extinguisher thus rovided for shall be discharged and examined at each annual nspection: *Provided,* That carbon tetrachloride fire extinguishers shall e tested for their pumping efficiency and the liquid discharged with roper care so that it may be replaced in the extinguishers. Carbon ioxide fire extinguishers shall be checked by weighing to determine ontents, and, if found to be more than 10 per cent under required ontents of carbon dioxide, shall be recharged.

Every fire extinguisher provided for and required by this secti shall be tested by the Bureau of Standards, Department of Co merce, and a report made by that bureau to the Board of Superv ing Inspectors, which shall then determine whether the said exti guisher shall be approved for use on vessels subject to inspection.

Every fire extinguisher approved after May 31, 1921, for use vessels under the jurisdiction of the Steamboat Inspection Servi shall have affixed thereto a metallic name plate having plain stamped thereon the name of the fire extinguisher, the rated capaci in gallons, quarts, or pounds, and the name and address of person firm for whom approved. (Sec. 4479, R. S.)

See page 196 for list of approved fire extinguishers.

WATER-SPRINKLING SYSTEM.

14. On and after December 31, 1916, all steamers carrying passe gers, and which also carry freight upon the main deck which is acce sible to passengers or crew while being navigated, shall have install in such main-deck freight space an efficient overhead water-sprinkli system.

The crew and passenger sleeping accommodations located belo the main deck on steamers engaged in the passenger traffic sh have installed therein an efficient overhead water-sprinkling syste unless such quarters and the bed frames therein are constructed metallic or noncombustible material, thereby making them practica fireproof.

On steamers carrying passengers where the kitchens or galleys a located below the main deck, there shall be installed in such kitche or galleys an efficient overhead water-sprinkling system. Th paragraph shall become effective July 1, 1917.

The water-sprinkling system above referred to shall be relia and efficient and so located that the volume of discharge shall sufficient to entirely cover or blanket the freight in case of fire, a to entirely and fully sprinkle the compartment in which the p sengers or crew may be accommodated below deck, and be install in such manner as to be easily and quickly accessible of operatio and shall be ready for service at all times when freight or passeng are on board. The operating valves for the sprinkling system sh be suitably marked. (Secs. 4405, 4417, 4418, 4472, R. S.)

FIRE EQUIPMENT ON VESSELS USING OIL AS FUEL.

(Effective July 1, 1930.)

15. On all passenger vessels there shall be fitted an approved c bon dioxide or foam type system for extinguishing fire in the bilg of each fire room. If engine and boiler rooms are not entirely separa and fuel oil can drain from the boiler room bilge into the engine roo the combined engine and boiler rooms shall be considered one co partment. The system shall be capable of being operated from convenient and accessible point outside of space protected.

When a carbon-dioxide (CO_2) system is fitted, the quantity carbon dioxide carried shall be sufficient to give a gas saturation 25 per cent of the gross volume of the largest boiler room from ta top to top of the boilers. The whole charge of gas shall be capable being released instantaneously by operating one valve and control. All cylinders shall be completely discharged in not more than two minutes. The arrangement of the piping shall be such as to give a general and fairly uniform distribution over the entire area protected. An alarm shall be provided to give a warning in the space when the carbon dioxide is about to be released. Provision shall be made to prevent the admission of air into the lower parts of the boiler room while the system is in operation.

When a foam type system is fitted, its capacity shall be such as to rapidly discharge over the entire area of the bilge (tank top) of the largest boiler room a volume of foam 6 inches deep. The arrangement of piping shall be such as to give a uniform distribution over the entire area protected. The foregoing system may be of a type employing either two-solution tanks or one or more generators using an approved dry chemical mixture.

All containers and valves by which they are operated shall be easily accessible and so placed that they will not readily be cut off from use by an outbreak of fire.

In addition to the foregoing, there shall be provided an approved hose application mounted on a hose reel for each boiler room, same to be provided with sufficient hose to reach any part of the space protected. The hose applications shall be of at least 100 pounds capacity for the carbon dioxide type or 40 gallons for the foam type.

On all vessels of over 500 gross tons using oil as fuel there shall be in each fireroom a metal tank containing 50 gallons of sand, fitted with a scoop or shaker, for fire purposes; also two or more approved fire extinguishers of the carbon dioxide (CO_2), carbon tetrachloride or foam type, placed accessible to the fireroom and ready for immediate use. Each of the above fire extinguishers shall not be less than 2½ gallons capacity. Fire extinguishers of less capacity are allowable when their total contents equal the required quantity: *Provided, however*, That vessels of 500 gross tons and under using oil as fuel may be fitted with metal tanks containing 25 gallons of sand and one of the above-described fire extinguishers.

FIRE-DETECTING AND ALARM SYSTEM.

16. All passenger vessels of more than 150 feet in length, whose construction is contracted for after June 30, 1916, which are provided with staterooms or other sleeping quarters for passengers, shall be equipped with an efficient fire-alarm system or indicator which will automatically indicate or register, at one or more points or stations where it can be most quickly observed by the officers or crew of the vessel, the presence or indication of fire in the staterooms and various other compartments of the vessel which are not accessible to the observation of the officers or crew: *Provided, however*, That cargo compartments need not be provided with an automatic registering or indicating fire-alarm system, if such cargo compartments are provided with other approved means for the officers and crew to discover the presence or indication of fire.

All passenger vessels, including ferry vessels, of more than 150 feet in length, whose construction is contracted for after January 1, 1930, shall be equipped with an approved system for the purpose o detecting and indicating the presence of fire, as follows:

An automatic electrical system or a pneumatic tube system shal be installed in all the sleeping quarters for passengers, officers, an crew, and an automatic electrical system, or a pneumatic tube syste or a smoke-detecting system shall be installed in all storeroom where inflammable material is carried, linen rooms, paint, oil an lamp rooms, and such additional compartments as the local inspector may deem necessary where fire is liable to occur, and a smoke-detecting system, or an automatic electrical system, or a pneumatic tub system shall be installed in all cargo compartments; said systems t be installed in accordance with specifications adopted by the Boar of Supervising Inspectors and approved by the Secretary of Commerce

Engine rooms, boiler rooms, companionways, hallways, bathrooms public rooms, and like spaces open to observation need not be provide with fire-indicating system. (Sec. 4472, R. S.)

SPECIFICATIONS FOR THE INSTALLATION, MAINTENANCE, AND USE O FIRE-DETECTING SYSTEMS ON VESSELS.

17. Provisions common to all systems:

1. *General.*—(*a*) All devices and equipment installed shall be of a type an character suitable for marine use; shall bear the indorsement of a recognize laboratory acceptable to the Board of Supervising Inspectors; and shall b approved by said board.

(*b*) In addition, parts and samples of any equipment shall be submitted b the manufacturers for test purposes, upon request of the Steamboat Inspectio Service.

(*c*) Furthermore, all apparatus, devices, and circuits of/as a complete syste shall withstand a 60-day endurance test without repair, one-half of which tim shall be at sea service.

(*d*) Fire-alarm systems shall not be used for the transmission of other tha fire-alarm signals.

(*e*) Systems shall be normally free of electrical grounds.

(*f*) All conductors shall conform to specifications for interior communicatio cable contained in the marine rules as adopted by the American Institute o Electrical Engineers as regards construction, size, leading, armoring, protection support, and details of installation, with the following exceptions: All conductors shall be lead sheathed to protect against moisture and conductors expose to mechanical injury shall be leaded and armored. Lead-sheathed conductor may be used for voltages of 60 volts or less.

2. *Maintenance and test.*—(*a*) With each equipment there shall be furnishe a framed chart which shall be visible in the wheelhouse at all times, bearing ful instructions for operation, maintenance, and test of the system.

(*b*) This chart shall bear tabulated spaces for the date and signature of licensed officer of the ship who shall witness or conduct tests of the system a intervals not less frequent than required in the specification forming part of th approval of the Steamboat Inspection Service. It is recommended that periodi inspections be made by the manufacturer of the equipment.

(*c*) The chart shall list the minimum spare material which is required in eac equipment in the specification forming part of the approval of the Steamboa Inspection Service.

3. *Classification.*—Protection shall be provided by systems of the followin types, used singly or in combination:

(*a*) *Electrical system*, using thermostats operating by heat to produce visua and audible signals.

(*b*) *Pneumatic-tube system*, using thermostats composed of copper tubin containing air, the expansion of which produces visual and audible signals.

(*c*) *Smoke-pipe system*, in which fire is indicated visually and by the sense o smell by smoke drawn through pipes and suitably illuminated.

NOTE.—Smoke-pipe systems are considered better adapted to cargo spaces and spaces not frequentl accessed. Rate of rise and fixed-temperature thermostatic systems are considered better adapted to livin quarters and spaces frequently accessed.

ELECTRICAL AND PNEUMATIC-TUBE SYSTEMS.

4. *Scope of installations.*—(*a*) For vessels 150 feet and under in length systems of these types shall provide one annunciator having a lamp or drop for each fire-alarm zone, this annunciator together with an alarm bell to be located in the wheelhouse or in the engine room.

(*b*) For vessels above 150 feet and under 350 feet in length systems of these types shall provide one annunciator having a lamp or drop for each fire-alarm zone, this annunciator together with an alarm bell to be located in the wheelhouse or chart room; and shall provide an auxiliary audible alarm in the engine room.

(*c*) For vessels 350 feet or more in length systems of these types shall provide one annunciator having a lamp or drop for each fire-alarm zone, this annunciator together with an alarm bell to be located in the wheelhouse or chart room or in a fire station in which a 24-hour watch is kept; and shall provide an auxiliary audible alarm in the engine room.

(*d*) Annunciators shall be clearly marked to show the fire-alarm zone protected and shall indicate or function until manually restored.

5. *Location of detectors—Electrical system.*—(*a*) Detectors (thermostats) shall be installed overhead in the high point of each compartment protected. At least one detector shall be installed in each such compartment.

(*b*) On smooth ceilings detectors shall be spaced not over 14 feet apart and the area protected by a single detector shall not exceed 196 square feet, and no point on the ceiling shall be more than 7 feet away from the detector at right angles from end wall or partition extending to ceiling. For the detectors of the wire type each circuit shall consist of a continuous length of thermostatic wire not exceeding 1,000 feet in length. The thermostatic wire shall extend into each compartment protected and no point on the ceiling shall be more than 10 feet away from the thermostatic wire.

(*c*) Thermostatic wire shall be run directly on the ceiling or within 12 inches of the ceiling on partitions or bulkheads.

(*d*) Ceilings divided into panels or bays by beams not more than 8 inches deep shall be regarded as smooth ceilings; otherwise each bay shall be regarded as a separate ceiling.

(*e*) Where these spacing requirements are impracticable because of unusual beam structures, special instructions shall be obtained from the Steamboat Inspection Service.

(*f*) All detectors in cargo spaces, or otherwise subject to mechanical injury, shall be suitably protected by substantial steel protectors crossing over in front of detectors and fastened to beams or brackets or the equivalent.

6. *Location of detectors—Pneumatic-tube system.*—(*a*) Each circuit shall consist of a continuous length of pneumatic tubing, not exceeding 1,000 feet in length, without branches or alternative paths.

(*b*) Tubing shall be run directly on ceilings or within 12 inches of ceiling on partitions or bulkheads.

(*c*) In every inclosed space or separate room there shall be exposed at least 5 per cent of total length of tubing or circuit.

(*d*) In no case shall less than 25 feet of exposed tubing be used in any inclosed space or separate room.

(*e*) On smooth ceilings no point on the ceiling shall be more than 12 feet from nearest point of tubing.

(*f*) Ceilings divided into panels or bays shall be regarded as smooth ceilings, provided beams are not more than 8 inches deep, otherwise at least one line of tubing shall be run in each bay.

(*g*) Where these spacing requirements are impracticable because of unusual beam structures, special instructions shall be obtained from the Steamboat Inspection Service.

(*h*) Where necessary, tubing shall be protected against mechanical injury.

(*i*) Tubing shall be inclosed in conduit or otherwise heat insulated where this is necessary in order to properly isolate signals.

7. *Zoning.*—(*a*) A single fire-alarm zone shall not include more than 50 individual rooms or storage lockers, nor extend over an area more than 100 feet fore and aft.

(*b*) Spaces separated by water-tight bulkheads or fire bulkheads shall not be included in the same zone, except that lockers within such space may be included in the zone. A fire-alarm zone shall not include spaces on more than one deck, except a single isolated locker or room on the deck above or deck below, and the further exception that adjacent peak spaces not exceeding a combined ceilin area of 3,000 square feet may be included in a single fire-alarm zone. On vesse where the water-tight bulkheads required by law do not extend to the weathe deck, the 'tween-deck spaces shall be considered as though each bulkhead extende to the weather deck.

(*c*) Systems shall be so designed that one zone becoming inoperative will no affect the operation of any other zones.

(*d*) The system shall be so arranged as to permit one or any number of fire alarm signals simultaneously, and an alarm on any one circuit shall not interfer with the operation of any other circuit.

8. *Supervision.*—(*a*) The source of energy and all electrical circuits, except a hereinafter provided, shall be under constant electrical supervision. In even of failure of the source of energy or a break in any supervised circuit, a distinctiv trouble signal shall sound continuously until the trouble is corrected. No switc for silencing this signal shall be provided unless its operation transfers the signa to a trouble lamp.

(*b*) All trouble circuits, the source of energy for trouble circuits, and normall open secondary circuits on control panels incased in metal protection need no be supervised.

(*c*) The thermostats themselves need not be supervised if connected in multiple

(*d*) Where multiple fire gongs are used, only one need be supervised.

9. *Current supply.*—(*a*) The source of energy for the fire-alarm system sha consist of a storage battery of sealed cells automatically charged from the mai bus bars of the lighting system, and used for no other purpose.

(*b*) The supply voltage shall be not less than 20 volts. The system shall b able to operate at 80 per cent of normal voltage.

(*c*) The capacity of the storage battery shall be sufficient to supply the syster for at least 48 hours without recharging, and shall be not less than 10 amper hours.

10. *Fuses.*—(*a*) Approved fuses of not less than 3-ampere nor more tha 6-ampere capacity shall be provided at or near the bus bars from which th charging current is taken and on charging panel in main discharge leads c battery.

11. *Control panels and devices.*—(*a*) All panels and devices shall be capable c operating when inclined to an angle of 45 degrees. Operation shall not b affected by vibration.

(*b*) Audible signals shall be produced on vibrating fire-alarm bells of inclose type with gongs not less than 6 inches in diameter.

(*c*) Provision shall be made for silencing the fire-alarm bell by means of switch operating when the door of the control-panel cabinet is open at least inches, or by equivalent means.

SMOKE-PIPE SYSTEMS.

12. *Scope of installations.*—Systems of this type shall provide one detectin device to which all smoke pipes shall lead, located in the wheelhouse or in a fi station in which a 24-hour watch is kept.

13. *Construction and installation.*—(*a*) The detecting device shall be such tha finely divided and diluted particles of smoke shall be readily indicated visuall The lighting arrangement shall be such as not to be disturbing to navigatio at night.

(*b*) Smoke collectors shall be installed overhead in each compartment protected and shall be so located that no point on the overhead deck is more tha 40 feet from a collector. The indicating pipes or tubing shall be not smalle than three-fourths inch inside diameter. When more than one smoke collector required for a compartment, not more than two collectors may be connected t one indicating pipe. Each compartment shall have one or more indicating pipe extending to the detecting device, except that the pipes from small adjacen compartments not exceeding a combined volume of 5,000 cubic feet may b joined. No smoke collector shall be located nearer to the edge of the openin of a ventilator than three times the diameter or equivalent diameter of th opening.

(*c*) The exhaust shall discharge into the compartment housing the detectin device for the detection of fire by odor; and a valve plainly marked and readil operable from that compartment shall be provided to direct the exhaust, obnoxious, to the outside.

(*d*) Suction fans shall be furnished in duplicate, and shall be provided wit switches to permit their operation from the emergency lighting circuit. Whe the emergency lighting voltage is less than the normal lighting voltage, one fan shall be so arranged that it may be operated from either source.

(*e*) A trouble signal shall be provided which will indicate the stopping of the suction fan due to worn brushes, etc., or the failure of the lamps used for illuminating the smoke particles.

(*f*) Where exposed to injury in cargo compartments the collectors and smoke pipes shall be reasonably protected against injury.

(*g*) All smoke pipes shall be installed to grade to low points and at low points provided with approved drains. These pipes shall be run with as easy bends as practicable.

OXYGEN-BREATHING APPARATUS, GAS MASKS, AND FLAME SAFETY LAMPS.

18. All passenger vessels which are provided with sleeping quarters for passengers shall be provided with oxygen-breathing apparatus, gas masks, and flame safety lamps, as follows:

(*a*) Vessels with 50 to 100 staterooms for passengers, 1 oxygen-breathing apparatus or 1 gas mask.

(*b*) Vessels with more than 100 staterooms for passengers, 2 oxygen-breathing apparatus or 2 gas masks and a flame safety lamp.

(*c*) Oxygen-breathing apparatus or gas masks shall be kept in operative condition in an accessible place, and, where more than one is carried, in widely separated places.

(*d*) The master and chief engineer shall train a sufficient number of officers and crew in their respective departments in the use of the equipment.

(*e*) Only oxygen-breathing apparatus and flame safety lamps that have been approved by the United States Bureau of Mines shall be accepted by this service.

(*f*) Oxygen-breathing apparatus shall be of at least one-half-hour period type, and gas masks shall have the approval of the United States Bureau of Mines under Schedule 14 A, type N.

(*g*) One extra cylinder for each oxygen-breathing apparatus and one extra canister for each gas mask shall be carried.

The requirements in the above section to be effective January 1, 1931.

INFLAMMABLE ARTICLES.

19. None of the inflammable articles specified in section 4472, Revised Statutes, or oil that will not stand a fire test of 300° F. shall be used as stores on any pleasure steamer or steamer carrying passengers, except that vessels not carrying passengers for hire may transport gasoline or any of the products of petroleum for use as a source of motive power for the motor boats or launches of such vessels. (Sec. 4472, R. S.)

PETROLEUM.

20. Refined petroleum which will not ignite at a temperature of less than 110° F. may, upon routes where there is no other practicable mode of transporting it, be carried on passenger steamers; but it shall not be lawful to receive on board or transport any petroleum unless the owner or master of the steamer shall have first received from the inspectors a permit designating the place or places on such steamer in which the same may be carried or stowed, with the further condition that the permit shall be conspicuously posted on the steamer.

Refined petroleum shall not in any case be received on board or carried unless it is put up in good iron-bound casks or barrels or in good metallic cans or vessels, carefully packed in boxes, and the casks,

barrels, or boxes plainly marked on the heads thereof with the sh
per's name, the name of the article, and the degree of temperatu
(Fahrenheit) at which the petroleum will ignite.

Lubricating oils shall be stored in secure tanks, casks, or cans
the engine-room compartments or storeroom, or in metal-lined lar
lockers or oil rooms. Kerosene or other illuminating oils meeti
the requirements of the law shall be stored in metallic tanks or ca
and carried in the oil rooms or lamp lockers constructed in accor
ance with the General Rules and Regulations. (Sec. 4472, R. S.)

21. Vessels carrying passengers or freight for hire permitted und
the authority of the act of Congress approved October 22, 191
amending section 4472, Revised Statutes of the United States,
transport and use gasoline or any of the products of petroleum f
the operation of engines to supply an auxiliary lighting and wirel
system independent of the vessel's main power plant, shall be allow
to carry not to exceed 40 gallons of gasoline or any of the produc
of petroleum for such purposes when contained in a seamless
lapwelded steel tank, cylindrical in form, not less than one-four
(0.25) of an inch thick, and of a capacity of at least 10 per cent mo
than the volume of the contents. The tank shall be tinned on t
inside and tested to 300 pounds pressure to insure tightness, a
fitted with a vent pipe of ample capacity, with no angles in pi
greater than 45°, opening to the atmosphere at a point not less th
10 feet above the highest house, the vent pipe to end with a U be
with the opening protected by wire gauze. The filling pipe or c
shall be entirely independent of other connections. The tank sh
be carried on the highest deck of the steamer and so located th
there may be a free circulation of air all around it.

Steamers engaged in transoceanic service or on voyages of mo
than 10 days' duration in either direction may carry such quantiti
of gasoline or any of the products of petroleum as may be necessa
to supply an auxiliary service already installed, the tanks alrea
installed and the location of same being allowed for this purpose. (
steamers where the auxiliaries are maintained by engines using t
heavy oils, the oil may be carried in quantities not to exceed 15 to
when contained in iron or steel tanks of sufficient strength to wit
stand the action of sea or temperature, and so located as to be pro
erly insulated or ventilated if either is necessary.

All tanks shall be firmly and properly secured to prevent bei
torn away from beds or saddles by heavy weather or excessive list
the ship, and shall be the object of daily inspection by the officers
the ship intrusted with their care.

There shall be placed within 5 feet of every tank containing gas
line, benzine, or naphtha not less than two fire extinguishers
approved carbon tetrachloride type or one of approved carbon dioxi
or foam types which have demonstrated a capacity for extinguishi
burning gasoline and other inflammable liquids, which fire exti
guishers shall be in addition to fire extinguishers already require
(Sec. 4472, R. S.)

See page 200 for list of approved tetrachloride, dioxide, and foa
type fire extinguishers.

FUNNEL CASING.

22. Steamers more than 150 feet in length under the jurisdiction of the Steamboat Inspection Service carrying passengers or passengers and freight and contracted for after June 30, 1927, shall, if the boiler-room compartment extends above the main or other decks, have same protected through all such decks by surrounding iron or steel bulkheads and the funnel or funnels protected by an iron or steel trunk or casing extending through and past all decks above their connection with the boiler-room compartment, and in such steamers where the boiler-room compartment does not extend above the main deck the funnel or funnels shall be protected by an iron or steel trunk or casing extending through and past all decks above their connection with the boiler or breeching. If the engine-room compartment extends above the main or other decks, same shall be protected through all such decks by surrounding iron or steel bulkheads and by an iron or steel ventilating shaft extending through and past the upper deck: *Provided*, That if such surrounding (engine-room) bulkheads are fitted with windows, the glass therein shall be of a fire-resisting quality, fitted in stationary metal sash frames.

INSTALLATIONS OF FUEL-OIL SYSTEMS.

23. Application to the Secretary of Commerce for permission to use petroleum or other mineral oils as fuel shall be made in triplicate on the prescribed blank form, and shall be forwarded through the local inspectors of the district where the installation is to be made. The application shall be accompanied by blue prints, in triplicate, showing the tanks, bracing, pumps, piping, riveting schedule, control valves, control apparatus, vent pipes, and the test to be applied to all fuel-oil tanks.

The construction of fuel-oil tanks separate from the hull shall conform to the following requirements: Plating for such tanks shall be not less than five-sixteenths of an inch in thickness; seams where the plates are joined shall be double riveted; all rivet holes shall be fairly drilled, or punched three-fourths diameter and reamed to size; rivet holes shall be spaced not to exceed four diameters; and, where practicable, the tanks shall be caulked inside and out.

Where double bottoms are used for the storage of fuel oil, such double bottoms shall be subdivided with one or more longitudinal water-tight bulkheads, except the narrow tanks at the forward and after ends of the vessel. This requirement shall also apply to fuel-oil deep tanks which shall also be fitted with the necessary swash plates. The hatch covers on deep tanks which are used for fuel oil shall be made of steel or iron plating and be fitted oil tight. Fuel-oil tanks in 'tween-deck spaces overhanging the boiler space or adjoining the ship's sides abreast of the boilers shall be avoided as far as practicable, but where found to be necessary, they shall be subdivided into compartments not exceeding 20 feet in length.

The test for fuel-oil tanks that do not form a part of the structure of the hull shall be a hydrostatic test of 15 pounds to the square inch, and all other tanks shall be tested with a pressure that will not be exceeded in practice.

Deep tanks, peak tanks, settling tanks, and tanks separate from t hull used for the storage of fuel oil shall be fitted with internal ga valves where the suction pipe or pipes penetrate the tank, the valv to be fitted with mechanical appliances so arranged that they m be operated from an accessible place on a deck outside of the machine space. Double-bottom fuel-oil tanks shall be fitted with a ga valve on the tank top where the suction pipe penetrates it, or, whe the suction pipe leads under the tank tops, the valve shall be plac where the pipe enters the machinery space.

No openings are to be cut in the bottoms, ends, or sides of fuel- tanks except for suction and heater connections.

The vent pipes from all fuel-oil tanks shall have a net cross-section area equal to that of the filling pipes, and shall be led from the t of the tank to the open air in a space where no danger will result fro the discharge of oil vapor; the discharge ends to be fitted with U ben and a gauze diaphragm, which can be easily removed for cleanin Where it is necessary to use bends in the piping, such bends shall n exceed 45° from the vertical. Where vent pipes pass through car spaces they must be protected against damage.

All pipes over 2 inches in diameter shall be attached to fuel- tanks by flanges, or flanged fittings, riveted to the tanks. Filli pipes for such tanks shall extend through the top of the tank to dec and such pipes shall be led to the bottoms of the tanks and fitted wi U bends extending upward at least 12 inches above the bottoms; in lieu of the U bends the pipes may be led to within one-half of t diameter of the pipes from the bottoms of the tanks.

Sounding pipes or other reliable apparatus shall be fitted to fu tanks for use in determining the oil level in each tank. Soundi pipes shall be led up through the deck and down to within one diamet of the bottom of the tank, and shall not be perforated. Such pip passing through cargo spaces shall be protected against damag Sounding pipes in the machinery spaces that do not extend up throu a deck shall be fitted with a valve or stop cock that will close aut matically to prevent oil overflow.

The piping between the service pumps and the stop valve at t burners, when the pressure exceeds 15 pounds per square inch, sh be extra heavy solid drawn piping and shall be in sight above t floor or platform. The connections on such piping shall be ma with extra heavy flanges or extra heavy fittings of malleable iro cast steel, or bronze. Valves on pipe lines conveying hot oil sh have bolted or locked bonnets regardless of size. The piping, i cluding connections, shall be tested in place to a hydrostatic pressu of 500 pounds per square inch. All other piping for use in conveyi fuel oil, together with valves and fittings, shall be suitable for pressure of 125 pounds and shall be tested in place to double th pressure.

All oil heaters shall be tested to double the working pressu Continuous pipe or pipes shall be carried through the heads or ends the heaters, and all joints shall be made on the outside to elimina the danger of oil being pumped into the boilers in the event of failu of the joints: *Provided, however,* That this requirement does n apply when the water of condensation from the heaters is led to observation tank or is not used for boiler feed water. Heaters m be installed in double bottoms, if so desired, when vessels are operati n cold waters and may be placed in the most convenient location for ieating the oil.

Fuel-oil pumps supplying oil to the burners, also oil strainers, hall be in duplicate, and the discharge of each pump shall be fitted vith an efficient relief valve that will return surplus oil to the suction ide of the pumps.

Where fuel-oil tanks are fitted in wooden vessels, lead pans or ining shall be placed under the tanks, the lead to be of a gauge veighing not less than eight pounds per square foot, this precaution eing made to prevent oil from getting into the bilges of the vessel.

Throttle valves on fuel-oil pumps shall be arranged so that they nay be operated from some accessible point outside of the pump-oom or fire-room inclosure.

Dampers in funnels or uptakes on oil-burning steamers shall be itted with a locking device in open position.

Suitable drip pans shall be installed to catch the drip from burners, uel-oil pumps, strainers, or any other place where necessary to revent oil from reaching the bilges of the vessel.

The boiler-room and funnel casings shall be insulated so as to revent the spread of fire to woodwork or other combustible material djacent to the casings in the event of an oil fire taking place in the ire room. (Secs. 4405, 4474, R. S.)

The above requirements shall take effect July 1, 1930.

RULE V.—LICENSED OFFICERS.

ORIGINAL LICENSES.

1. The first license issued to any person by a United States inpector shall be considered an original license, where the United States ecords show no previous issue to such applicant.

Before an original license is granted to any person to act as master, nate, pilot, or engineer he shall personally appear before some board f local inspectors for examination. Any person who has attained he age of 21 years and is qualified in all other respects shall be eligible or examination: *Provided*, That license as third mate, third assistant ngineer, or second-class pilot may be granted to applicants who ave reached the age of 19 years, and are qualified in all other respects: *rovided further*, That no such license may be raised in grade before he holder thereof shall have reached the age of 21 years.

Inspectors shall, before granting an original license to any person act as an officer of a vessel, require the applicant to make written pplication upon the blank form furnished by the Department of ommerce, to be filed in the inspectors' office. When practicable, pplicants for license as master, mate, pilot, or engineer shall present the inspectors, to be filed with their application, discharges or tters from the master or other officer under whom they have served, rtifying to the name of the vessel and in what capacity the appliant has served under him; also period of such service. Inspectors hall also, when practicable, require applicant for pilot's license to ave the written indorsement of the master and engineer of the essel upon which he has served, and of one licensed pilot as to his ualifications. In the case of applicants for original engineer's cense, they shall also, when practicable, have the indorsement of the master and engineer of a vessel on which they have serve together with one other licensed engineer.

No original license shall be issued to any naturalized citizen less experience in any grade than would have been required of citizen of the United States by birth.

Before granting an original license to any naturalized citizen act as master, mate, pilot, or engineer, inspectors shall require t applicant to produce his naturalization certificate. In the eve the applicant is without such certificate, or there is any doubt wha soever about the citizenship of the applicant, he shall be required produce a certificate from the proper United States naturalizati officer certifying to the citizenship of the applicant. (Sec. 44 R. S.)

MEDICAL EXAMINATION FOR ORIGINAL LICENSE.

2. No candidate for original license as master, mate, pilot, or en neer shall be examined until he presents a certificate from the Unit States Public Health Service, duly attested, that he has passed satisfactory oral examination based upon the contents of the "Manu on Ship Sanitation and First Aid" or some other manual arrang for the purpose having the approval of the United States Pub Health Service.

No original license as master, mate, pilot, or engineer shall issued except upon the official certificate of a surgeon of the Unit States Public Health Service respecting the eyesight, hearing, a physical condition of the applicant.

Where from distance or other cause, except as hereinafter p vided, an applicant would be put to great inconvenience or gre expense to appear before a surgeon of the United States Pub Health Service for examination, the certificate of a reputable phy cian may be accepted in lieu of the certificate of the Public Hea Service, and the Supervising Inspector General may waive t examination for a like cause: *Provided*, That in no case shall original license as master, mate, or pilot be issued except upon t certificate of a surgeon of the United States Public Health Serv respecting the acuity of vision and color sense of the applicant.

In the event any license shall have been issued without the c tificate of a surgeon of the United States Public Health Service, provided for herein, the inspector who issued such license sh immediately make a written report of the circumstances of the ca to the Supervising Inspector General and retain a copy of such rep in the office file containing the record of the applicant's examinati for license.

Applicants for license as engineer shall not be subjected to exa nation as to ability to distinguish colors. (Secs. 4439, 4440, 44 R. S.)

MEDICAL EXAMINATION FOR RENEWAL OF LICENSE AND RAISE GRADE.

3. No license as master, mate, or pilot shall be renewed or ra of grade granted except upon the official certificate of a surgeon the United States Public Health Service that the color sense of applicant is normal.

Nothing herein contained shall debar an applicant who has lost the ight of one eye from securing a renewal of his license, provided he is ualified in all other respects.

In the event an applicant for renewal of license is pronounced olor blind the inspectors may grant him a license limited to service uring daylight only.

Applicants for renewal of license or raise of grade as engineer hall not be subjected to examination as to ability to distinguish olors.

In the event an inspector finds that an applicant for raise of grade r renewal of license obviously suffers from near-sightedness, eye isease, poor hearing, or some other physical or mental infirmity to degree that, in the opinion of the inspector, would render him ncompetent to perform the ordinary duties of an officer at sea, he hall be required to undergo an examination by a surgeon of the ublic Health Service to determine his competency in such respects.

If the applicant subsequently produces a certificate from the Public ealth Service to the effect that his condition has improved to a atisfactory degree, or is normal, he shall be qualified in this respect.

Where from distance, or other cause, the applicant would be put o great inconvenience or expense to appear before a surgeon of the ublic Health Service for examination the certificate of a reputable hysician, or an oculist for vision or color sense, may be accepted in ieu of the certificate of a surgeon of the Public Health Service. (Secs. 439, 4440, 4442, R. S.)

PROFESSIONAL EXAMINATION.

4. Before an applicant for original license as master, mate, pilot, r engineer, or raise of grade of any license, or any extension of route, ay be examined the applicant shall, if practicable, present to the nspectors discharges or letters certifying to the amount and character f his experience. If the amount and character of his experience is atisfactory and he is eligible in all other respects the applicant shall e examined as to his knowledge, in writing, by a board of local nspectors: *Provided, however*, That upon navigable waters of the nited States newly opened to steamboat navigation, and where the nly pilots obtainable are illiterate Indians or other natives, the fact hat such persons can neither read nor write shall not be considered bar to such Indians or other natives receiving license as pilot of team vessels, provided they are otherwise qualified therefor.

A record of every application for license, raise of grade, and extenion of route, together with all examinations, medical certificates, nd correspondence in connection therewith, shall be kept on file in he office of the local inspectors of the district.

When the application of any person for license has been approved shall be the duty of the inspectors to give the applicant the required xamination as soon as practicable. (Secs. 4405, 4439, 4440, 4441, 442, R. S.)

REEXAMINATIONS AND REFUSAL OF LICENSES.

5. Any applicant for license who has been duly examined and reused may come before the same local board for reexamination at ny time thereafter that may be fixed by such board, but he shall

not be examined by any other local board until one year has expir from the date of the refusal without the sanction of the board th refused the applicant.

If the inspectors shall decline to grant the applicant the licen asked for, they shall furnish him a statement, in writing, setti forth the cause of their refusal to grant the same. (Secs. 4405, 445 R. S.)

PREPARATION OF LICENSES.

6. All licenses hereafter issued to masters, mates, pilots, a engineers shall be filled out on the face with pen and black ink inste of typewritten. Inspectors are directed, when licenses are complete to draw a broad pen and black-ink mark through all unused spaces the body thereof, so as to prevent, as far as possible, illegal inte polation after issue.

Every person receiving license or certificate of lost license sh sign same upon back thereof immediately upon its receipt. (Se 4405, R. S.)

CERTIFICATE OF LOST LICENSE.

7. In case of loss of license of any class from any cause any boa of local inspectors upon receiving satisfactory evidence of such lo and a record of the lost license from the board that issued same sh issue a certificate to the owner thereof, which shall have the authori of the lost license for the unexpired term, unless in the meantime t holder thereof shall have the grade of his license raised, after due e amination, in which case a license in due form for such grade may issued. In all cases where a certificate of lost license is issued by board other than the board that issued the lost license the certifica of lost license shall state what board issued the lost license.

Whenever a license is reported to a board of local inspectors by licensed officer as having been stolen from him, or whenever a licen is stolen from an office of local inspectors, the local inspectors sh immediately report the fact in either case to the Supervising Inspect General and give a full description of the license. (Sec. 4405, R.

PARTING WITH LICENSE.

8. Any license granted to a master, mate, pilot, engineer, operator shall be immediately revoked if, for any purpose, the hold thereof voluntarily parts with its possession or places it beyond personal control by pledging or depositing it with another. (S 4405, R. S.)

RENEWAL OF LICENSE.

9. Whenever an officer shall apply for a renewal of his licen for the same grade, the presentation of the old license, with sat factory certificate of visual examination, where required, and w oath of office, shall be considered sufficient evidence of his title renewal, which old license and oath of office shall be retained the inspectors upon their official files as the evidence upon wh the license was renewed: *Provided*, That it is presented within months after the date of its expiration, unless such title has be forfeited or facts shall have come to the knowledge of the inspect which would render a renewal improper; nor shall any license

renewed more than 30 days in advance of the date of the expiration thereof, unless there are extraordinary circumstances that shall justify a renewal beforehand, in which case the reasons therefor must appear in detail upon the records of the inspectors renewing the license.

Whenever an officer shall apply for renewal of his license for same grade, after 12 months after the date of its expiration, he shall be required to pass an examination for the same grade of license. The renewed license in either case shall receive the next higher number for number of issue of present grade and for number of issues of all grades.

Whenever a licensed officer makes application for a renewal of his license, he shall appear in person before some board of local inspectors or supervising inspector, except that upon renewal of such license for the same grade, when the distance from any local board or supervising inspector is such as to put the person holding the same to great inconvenience and expense to appear in person, he may, upon taking oath of office before any person authorized to administer oaths, and forwarding the same, together with the license to be renewed and certificate of visual examination where required, to the local board or supervising inspector of the district in which he resides or is employed, have the same renewed by the said inspectors, if no valid reason to the contrary be known to them; and they shall attach such oath to the stub end of the license, which is to be retained on file in their office: *Provided, however*, That any officer holding a license, and who is engaged in a service which necessitates his continuous absence from the United States, may make application in writing for renewal and transmit the same to the board of local inspectors, with his certificate of citizenship, if naturalized, and a statement of the applicant, verified before a consul or other officer of the United States authorized to administer an oath, setting forth the reasons for not appearing in person; and upon receiving the same the board of local inspectors that originally issued such license shall renew the same and shall notify the applicant of such renewal, and no license as master, mate, or pilot of any class of vessel shall be renewed without furnishing a satisfactory certificate of color blindness. (Secs. 4405, 4438, R. S.)

EXTENSION OF ROUTE AND RAISE OF GRADE OF LICENSES.

10. Licensed officers serving under five years' license, entitled by license and service to raise of grade, after passing examination, shall have issued to them new licenses for the grade for which they are qualified, the local inspectors to file in their office the old license when surrendered, with the report of the circumstances of the case, but the grade of no license shall be raised except as hereinafter provided, unless the applicant can show one year's actual experience in the capacity for which he has been licensed.

Inspectors shall, before granting an extension of route or raise of grade of license, require the applicant to make his written application upon the blank form of application for extension of route or raise of grade of license furnished by the department. When practicable, applicants for extension of route or raise of grade of license shall present to the inspectors, to be filed with the application, dis-

charges or letters from the master or other officer under whom th
have served, or other satisfactory documentary evidence, certifyi
to the name of the vessel and in what capacity the applicant h
served; also period of such service.

If any board of local inspectors is satisfied by the documenta
evidence submitted that a pilot is entitled by experience and kno
edge to unlimited tonnage, it may remove any tonnage restrictio
which may have been placed upon his license by any other board
local inspectors.

Except as hereinafter provided, practical service in the deck d
partment of an ocean or coastwise vessel propelled by machine
shall be accepted when offered in documentary evidence by any pe
son applying for an original license or raise of grade as equal to t
same amount of service in any ocean or coastwise steam passeng
vessel.

Service on United States lighthouse tenders propelled by machi
ery shall be considered as equivalent experience for raise of grade
that obtained on vessels subject to inspection by this service.

Service on United States light vessels propelled by machinery sh
be considered as one-half experience for raise of grade as that o
tained on vessels subject to inspection by this service. (Sec. 44
R. S.)

EXAMINATION FOR RENEWAL OF MASTER'S OR PILOT'S LICENSE.

11. It shall be the duty of all inspectors, before renewing an exi
ing license to a master or pilot of steam vessels, for any waters, w
has not been employed as master or pilot on such waters during t
three years preceding the application for renewal, to satisfy the
selves, by an examination in writing, or orally, to be taken down
writing by the inspectors, that such officers are thoroughly famil
with the pilot rules upon the waters for which they are license
(Secs. 4439, 4442, R. S.)

LAWS, GENERAL RULES AND REGULATIONS, AND PILOT RULFS TO FURNISHED LICENSED OFFICERS.

12. Every master, mate, pilot, and engineer of vessels shall, wh
receiving an original license, a renewed license, or a raise of grade
license, be furnished by the inspectors with a copy of the La
Governing the Steamboat Inspection Service, and a copy of t
General Rules and Regulations Prescribed by the Board of Sup
vising Inspectors, and every master and pilot of vessels and operat
of motor vessels shall, when receiving an original license, a renew
license, or a raise of grade of license, be furnished by the inspecto
with a pamphlet copy of the rules and regulations governing pil
and of the statutes upon which such rules are founded, applicable
the waters on which their licenses are intended to be used, as stat
in the body thereof. (Sec. 4405, R. S.)

SUSPENSION AND REVOCATION OF LICENSES.

13. When the license of any master, mate, pilot, or engineer
revoked such license expires with such revocation, and any lice
subsequently granted to such person shall be considered in the lig

of an original license except as to number of issue. And upon the revocation or suspension of the license of any such officer said license shall be surrendered to the local inspectors or supervising inspector ordering such suspension or revocation.

When the license of any master, mate, engineer, or pilot is suspended the inspectors making such suspension shall determine the term of its duration, except that such suspension shall not extend beyond the time for which the license was issued.

The suspension or revocation of a joint license shall debar the person holding the same from the exercise of any of the privileges therein granted, so long as such suspension or revocation shall remain in force. (Sec. 4450, R. S.)

MISCONDUCT OF LICENSED OFFICERS.

14. Whenever a supervising, local, or assistant inspector of steam vessels, or any of them, shall find on board any vessel subject to the provisions of Title LII of the Revised Statutes any licensed officer under the influence of liquor or other stimulant to such an extent as to unfit him for duty, or when any licensed officer shall use abusive or insulting language to any inspector or assaults any such inspector while on official duty, the local inspectors or the supervising inspector shall immediately suspend or revoke the license of the officer so offending without further trial or investigation.

The fact of a licensed officer being under the influence of liquor in the presence of the inspector or inspectors to such an extent as to unfit him for duty while on board a vessel shall be sufficient cause for such suspension or revocation. (Secs. 4405, 4450, R. S.)

LICENSES TO OFFICERS OF VESSELS OWNED BY THE UNITED STATES.

15. Any person who has served at least one year as master, commander, pilot, or engineer of any steam vessel owned and operated by the United States in any service in which a license as master, mate, pilot, or engineer was not required at the time of such service shall be entitled to license as master, mate, pilot, or engineer, if the inspectors, upon written examination, as required for applicants for original license, may find him qualified: *Provided*, That the experience of any such applicant within three years of making application has been such as to qualify him to serve in the capacity for which he makes application to be licensed. (Secs. 4439, 4440, 4441, 4442, R. S.)

REPORTS OF ACCIDENTS TO VESSELS.

16. The licensed officer in command of any vessel shall report in writing and in person to the board of local inspectors nearest the port of first arrival any accident to said vessel involving loss of life or damage to property to an approximate amount exceeding $500, and shall also report in the same manner any casualty or loss of life from whatever cause of any person on board such vessel and any stranding or grounding, whether or not any damage has been sustained by the vessel. If the accident happens upon the high seas or without the jurisdiction of inland waters, the board to whom the report is first made shall make the investigation; but if the accident occurs within the jurisdiction of inland waters, the report shall be trans-

mitted to the board within whose jurisdiction the accident occurre which board shall make the investigation, except in cases where, the judgment of the Supervising Inspector General, better resu may be obtained by another board conducting the investigation, which case the Supervising Inspector General is authorized to dire such investigation by another board: *Provided*, That when fro distance it may be inconvenient to report in person it may be do in writing only, and the report sworn to before any person authoriz to administer oaths.

Whenever a vessel commanded by an officer licensed by the Stea boat Inspection Service collides with a lightship, buoy, or other a to navigation under the jurisdiction of the Bureau of Lighthouses, is connected with any such collision, it shall be the duty of t licensed officer in command of such vessel to report the accident the nearest board of local inspectors. When any collision of tl character is reported to a board of local inspectors, those office shall immediately transmit such information to the superintende of lighthouses of the district in which the collision occurred.

Failure to promptly render the reports required by this secti shall be deemed sufficient cause for suspension or revocation of licen

Whenever in an investigation of an accident to a vessel, made a board of local inspectors, it is stated by the officers of the ves concerned, or it is developed by the investigation, or it is stated in report of an accident, that the accident was due to a collision with light vessel, buoy, or other aid to navigation under the jurisdicti of the Lighthouse Service, or to any fault of any such aid, or to the la of such aid, the local inspectors investigating the case, or to wh the report was made, shall promptly report to the Commissioner Lighthouses, through the supervising inspector of the district a the Supervising Inspector General, on the form provided for t purpose, the location of the accident; the aid to navigation near at which the accident occurred; the nature of the accident; t alleged cause of the accident; whether or not the accident was d to some alleged fault of the aid, either in its operation or locatic the proposed improvement in the aid, if such has been suggeste and all other information or suggestions coming to them which wou be of value to the Lighthouse Service. If an investigation was he the findings of the board shall also be reported. Local inspect shall also report in the same manner any other information suggestions coming to them concerning the need of additional a to navigation or the modification of any existing aids.

Boards of local inspectors are authorized to call on the super tendent of lighthouses of the district for any information concerni aids to navigation that will be useful in an investigation of an ac dent. (Secs. 4405, 4448, R. S.)

ONLY CERTAIN PERSONS ALLOWED IN PILOT HOUSE AND ON NAVIGATO BRIDGE.

17. Masters and pilots of steamers carrying passengers shall clude from the pilot houses and navigator's bridge of such steame while under way, all persons not connected with the navigation such steamers, except officers of the Steamboat Inspection Servi Coast Guard, and engineer officers of the United States Army

charge of the improvement of that particular waterway, when upon business: *Provided*, That licensed officers of steamboats, persons regularly engaged in learning the profession of pilot, officers of the United States Navy, United States Coast and Geodetic Survey, and Lighthouse Service, assistant engineers of the Engineer Department of the United States Army connected with the improvement of that particular waterway, and the engineer officers connected with the construction and operation of the Panama Canal may be allowed in the pilot house or upon the navigator's bridge upon the responsibility of the officer in charge.

The master of every such passenger and ferry steamer shall keep three printed copies of this section of Rule V posted in conspicuous places on such steamer, one of which shall be kept posted in the pilot house.

Such printed copies shall be furnished by the Department of Commerce to local inspectors for distribution. (Sec. 4405, R. S.)

STATION BILLS, DRILLS, AND REPORTS OF MASTERS.

18. It shall be the duty of the officer in charge of every steamer carrying passengers and all other steamers of over 500 gross tons and subject to inspection, to cause to be prepared station bills, in which shall be assigned a post or station of duty for every person employed on board such vessel in case of fire or other disaster, which station bills shall be placed in the most conspicuous places on board for the observation of the crew. And it shall be the duty of the master, or of the mate or officer next in command once at least in each week, to call all hands to quarters and exercise them in discipline, and in the unlashing and swinging out of the lifeboats, weather permitting, and in the use of the fire pumps, and all other apparatus for the safety of life on board of such vessel, with especial regard for the drill of the crew in the method of adjusting life preservers and educating passengers and others in this procedure, and to see that all the equipments required by law are in complete working order for immediate use; and the fact of the exercise of the crew, as herein contemplated, shall be entered upon the vessel's log book.

The rule relating to fire and boat drills contemplates that such drills shall be conducted precisely as though an emergency existed. To accomplish the purpose of the rule, lifeboat covers and strongbacks shall be removed, plugs put in place, painters carried forward and secured so as to provide a good lead and slack to hold the boat in position under the davits when in the water. The hand pumps and fire pump shall be operated long enough and a sufficient number of outlets used to insure that such equipment is in order and effectual.

It shall be the duty of the inspectors to require the officers and crew of all such vessels to perform the aforesaid drills and discipline in the presence of said inspectors at intervals sufficiently frequent to assure the said inspectors by actual observation that the foregoing requirements of this section are complied with.

The entries in the vessel's log book relating to the exercise of the crew in fire and boat drills shall state the day of the month and hour when so exercised, length of time of drill, number on boats swung out, number of lengths of hose used, and a statement of the condition c all fire and life-saving apparatus.

The master of every passenger steamer shall report monthly th day and date of such exercise and drill, the condition of the vess and her equipment, and also the number of passengers carried. Th report shall be made to the local inspectors at the port where th vessel was last inspected.

The *general* fire-alarm signal shall be a continuous rapid ringing c the ship's bell for a period of not less than 20 seconds, and this signa shall not be used for any other purpose whatsoever. The maste of any vessel may establish such other emergency signals, in additio to the ringing of the ship's bell, as will provide that all the office and all the crew of the vessel will have positive and certain notice c the existing emergency. Any neglect or omission on the part of th officer in command of such vessels to strictly enforce the provisior of this rule shall be deemed cause for suspension or revocation of th license of such officer.

Three copies of this section shall be furnished every steamer carryin passengers, and one copy to all other vessels to which this sectio applies, to be framed under glass and posted in conspicuous place about the vessel. (Sec. 4405, R. S.)

VESSELS REQUIRING LICENSED MASTERS.

19. There shall be a duly licensed master on board every stea vessel of more than 150 gross tons whenever such steamer is unde way, and also upon every ocean and coastwise seagoing mercha vessel of the United States propelled by machinery, and upon ever ocean-going vessel carrying passengers, subject to the inspection law of the United States. (Secs. 4439, 4463, R. S.)

ALARM BELLS.

20. All steam vessels of over 100 gross tons shall have all sleepin accommodations equipped with an alarm bell unless there is a watc man always on duty in such apartment or the apartment is so situate and arranged that the inspectors consider such bell unnecessary c dangerous. Where electric bells are installed they shall be operate by a switch from the pilot house or bridge. (Sec. 4405, R. S.)

STEERING GEAR TEST.

21. On all ocean vessels under the jurisdiction of the Steamboa Inspection Service making voyages of more than 48 hours' duratio the entire steering gear, the whistle, the means of communicatio and the signaling appliances between the bridge or pilot house an engine room shall be examined and tested by a licensed officer of th vessel within a period of not more than 12 hours before leaving por All such vessels making voyages of less than 48 hours' duration sha be so examined and tested at least once in every week. The fact an time of such examination and test shall be recorded in the ship's lo book. (Sec. 4405, R. S.)

WHISTLING.

22. Unnecessary sounding of the steam whistle is prohibited withi any harbor limits of the United States. Whenever any license

officer in charge of any steamer authorizes or permits such unnecessary whistling, upon conviction thereof before any board of inspectors having jurisdiction, such officer shall be suspended from acting under his license as the inspectors trying the case may deem proper. (Sec. 4405, R. S.)

DRAFT.

23. The master of every seagoing vessel shall, whenever leaving port, enter the maximum draft of his vessel in the log book. (Sec. 4405, R. S.)

HATCHES.

24. It shall be the duty of the master of any vessel under the jurisdiction of the Steamboat Inspection Service to assure himself before proceeding to sea that all exposed cargo hatches of his vessel are properly covered.

The covers shall be made water-tight by the use of pliable gaskets, or by heavy canvas tarpaulins thoroughly covering the hatch covers and firmly secured in place by battens, which shall be securely fastened by toggles or wedges, or by the use of efficient screw fastenings.

Failure by the master of any such vessel to observe this regulation shall be sufficient cause for suspension or revocation of his license on a charge of inattention to his duty. (Secs. 4405, 4417, R. S.)

LOOKOUTS AND WATCHMEN.

25. All steamers navigating the ocean during the nighttime shall have a lookout at all times at or near the bow and one watchman in each cabin and steerage. (Sec. 4477, R. S.)

All watchmen shall be under the direct charge of the master or officer in command of the vessel, and each shall report to the officer in command at the pilot house at fixed intervals of not longer than every hour. (Sec. 4477, R. S.)

All passenger steamers shall, in addition to the regular pilot on watch, have one of the crew also on watch, in or near the pilot house; and this rule applies to all steamers navigating in the nighttime. (Sec. 4477, R. S.)

SEARCHLIGHT.

26. Any master or pilot of any steam vessel who shall flash or cause to be flashed the rays of the searchlight into the pilot house of a passing vessel shall be deemed guilty of misconduct and shall be liable to have his license suspended or revoked. (Sec. 4405, R. S.)

UNAUTHORIZED LIGHTS.

27. Any master or pilot of any steam vessel who shall authorize or permit the carrying of any light, electric or otherwise, not required by law, on the outside structure of the cabin or hull of the vessel that in any way will interfere with distinguishing the signal lights shall, upon conviction thereof before any board of inspectors having jurisdiction, be deemed guilty of misconduct and shall be liable to have his license suspended or revoked. (Secs. 4405, 4450, R. S.)

SANITARY CONDITION.

28. It shall be the duty of the master and chief engineer of an vessel under the jurisdiction of the Steamboat Inspection Service t see that such vessel and the passenger and crew's quarters are kep in a sanitary condition. Failure on the part of the master (or chi engineer so far as it applies to the engineers' department) of an vessel to observe and carry into effect this section shall be sufficien cause for the suspension of his license on a charge of inattention t his duties.

SUBSTITUTING SERVICE IN NEXT LOWER GRADE FOR RAISE OF GRAD

29. Except as hereinafter provided, an applicant who has served i a lower grade than that for which he is licensed may substitut service in the grade next below that for which he is licensed, whic service shall count one-half in computing experience for raise of grad For example, if an applicant while holding license as chief mate c first assistant engineer serves nine months as chief mate or fir assistant engineer and six months in the next lower grade, the s months' service shall count as three months in the higher grade i either case. (Sec. 4405, R. S.)

MASTER OF OCEAN STEAM VESSELS.

30. An applicant for license as master of ocean steam vessels sha be eligible for examination after he has furnished satisfactory docu mentary evidence to the local inspectors that he has had the followin experience and is qualified in all other respects:

First. One year's service as chief mate of ocean steam vessels c 1,000 gross tons or over; or,

Second. One year's service as chief mate of coastwise steam vesse of 2,000 gross tons or over; or,

Third. Two years' service as second mate of ocean steam vessels c 1,000 gross tons or over while holding a license as chief mate of suc vessels; or,

Fourth. Two years' service as second mate of coastwise stea vessels of 2,000 gross tons or over while holding a license as chi mate of such vessels; or,

Fifth. One year's service as master of coastwise steam vessels c 2,000 gross tons or over; or,

Sixth. Two years' service as master of ocean or coastwise sa vessels of 700 gross tons or over, for license as master of freight c towing steam vessels of not more than 3,000 gross tons; or,

Seventh. Thirty-six months' service as master of steam vessels c 4,000 gross tons or over upon the waters of the Great Lakes, togeth with 12 months' service as second mate of ocean steam vessels of 1,00 gross tons or over. (Sec. 4439, R. S.)

EXAMINATION FOR MASTER OF OCEAN STEAM VESSELS.

31. An applicant for license as master of ocean steam vessels sha pass a satisfactory examination as to his knowledge of the followin subjects:

1. Latitude by Polaris.
2. Latitude by reduction to meridian (sun, moon, or star).

3. Longitude by chronometer (sun, moon, or star).
4. Position finding by two or more heavenly bodies out of the ridian.
5. Position finding by dead reckoning.
6. Great circle sailing.
7. Azimuth by altitudes of sun, moon, or star.
8. Constructing deviation table by bearings of a fixed object.
9. Chart navigation.
10. Time of high water by calculation.
11. Fuel conservation.
12. Signaling by semaphore and blinker.
13. Stability and hull construction.
14. International Code of Signals.
15. International Rules of the Road.
16. Life-saving apparatus.
17. Deviation and compass compensation.
18. Ocean winds, weather, and currents.
19. Instruments and accessories used in navigation.
20. Aids to navigation.
21. Seamanship.
22. Chart construction.
23. Ship sanitation.
24. United States Navigation Laws.
25. Rules and Regulations of the Board of Supervising Inspectors.
26. Such further examination of a nonmathematical character as e local inspectors may require. (Sec. 4439 R. S.)

MASTER OF COASTWISE STEAM VESSELS.

32. An applicant for license as master of coastwise steam vessels all be eligible for examination after he has furnished satisfactory cumentary evidence to the local inspectors that he has had the llowing experience and is qualified in all other respects:

First. One year's service as chief mate of ocean or coastwise steam ssels; or,

Second. Two year's service as second mate of ocean or coastwise eam vessels while holding a license as chief mate of ocean or coastse steam vessels; or,

Third. Two years' service as master of lake, bay or sound steam ssels of 500 gross tons or over, together with six months' service as ief mate or twelve months' service as second mate of ocean or astwise steam vessels, while holding license as master of such lake, y or sound steam vessels; or,

Fourth. Five years' service on ocean or coastwise sail vessels of 0 gross tons or over, two years of which service shall have been as ister of such vessels, for license as master of coastwise freight and wing vessels of not over 750 gross tons; or,

Fifth. One year's service as a licensed master of ocean or coastwise l vessels of 700 gross tons or over for a license as master of coastwise ight or towing vessels of not more than 3,000 gross tons; or,

Sixth. Two years' service as master or first-class pilot of lake, bay sound towing steamers of 150 gross tons or over, for license as master coastwise towing steam vessels of 750 gross tons or under; or, Seventh. Two years' service as master of steam vessels of 1, gross tons or over, except ferry vessels, on the Great Lakes and ot lakes, bays, or sounds, for license as master of coastwise vessels routes not exceeding 300 miles; or,

Eighth. Two years' service as a licensed master of steam vessel 250 gross tons or over, engaged in the ocean or coastwise fisheries, license as master of coastwise, freight or towing vessels of not m than 750 gross tons. (Sec. 4439, R. S.)

EXAMINATION FOR MASTER OF COASTWISE STEAM VESSELS.

33. An applicant for license as master of coastwise steam ves on routes exceeding 300 miles shall pass a satisfactory examinatio to his knowledge of the following subjects:

1. Latitude by Polaris.[3]
2. Latitude by reduction to meridian (sun or star).
3. Longitude by chronometer (sun or star).
4. Ship's position by lines of position.[3]
5. Ship's position by dead reckoning.
6. Azimuth by altitude of sun or star.[3]
7. Chart navigation.
8. Time of tide by tables.
9. Speed by engine revolutions.[3]
10. Distance off a fixed object.
11. Change in draft due to density of water.[3]
12. Signaling by semaphore.
13. Stowage.
14. International Code of Signals.
15. International Rules of the Road.
16. Life-saving apparatus.
17. Magnetism, with regard to a ship's compass.
18. Coastwise winds and currents.
19. Instruments and accessories used in navigation.
20. Aids to navigation.
21. Seamanship.
22. Hull nomenclature.
23. Ship sanitation.
24. United States Navigation Laws.
25. Rules and Regulations of the Board of Supervising Inspect
26. Such further examination of a nonmathematical characte the local inspectors may require.

An applicant for license as master of coastwise steam vessels routes of 300 miles or less shall be required to pass a satisfact examination as to his knowledge of the following subjects:

1. Chart navigation.
2. Distance off a fixed object.
3. International Rules of the Road.
4. Storm signals.
5. Aids to navigation on route.
6. Stowage.
7. Signaling by semaphore.
8. Instruments and accessories used in navigation.

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[3] Not to be given applicants for towing-steamer license.

9. United States Navigation Laws.

10. Rules and Regulations of the Board of Supervising Inspectors.

11. Such further examination of a nonmathematical character as e local inspectors may require. (Sec. 4439, R. S.)

MASTERS OF SAIL VESSELS.

34. An applicant for license as master of sail vessels of over 700 oss tons shall be eligible for examination after he has furnished tisfactory documentary evidence to the local inspectors that he has d the following experience:

First. Five years' service in the deck department of sail vessels 200 gross tons or over; one year of such service shall have been as aster of sail vessels of 500 gross tons or over; or,

Second. Two years' service as master of sail vessels of 200 gross ns or over; or,

Third. Two years' service as mate of sail vessels of 500 gross tons over; or,

Fourth. Two years' service as master of auxiliary sail vessels of 0 gross tons or over. (Sec. 4439, R. S.)

EXAMINATION FOR LICENSE AS MASTER OF SAIL VESSELS.

35. An applicant for license as master of sail vessels shall pass a tisfactory examination as to his knowledge of the following subcts:

1. Latitude by meridian altitude of the sun.
2. Latitude by pole star.
3. Longitude by chronometer (a. m. or p. m.).
4. Ship's position by dead reckoning.
5. Mercator's sailing.
6. Deviation of the compass by an amplitude.
7. Deviation of the compass by an azimuth.
8. Chart navigation.
9. International code of signals.
10. Storm signals.
11. International rules for preventing collisions at sea.
12. Use of gun and rocket apparatus for saving life from shipreck, as practiced by the United States Coast Guard.
13. Such further examination of a nonmathematical character as e local inspectors may require. (Sec. 4439, R. S.)

CHIEF MATE OF OCEAN STEAM VESSELS.

36. Any applicant for license as chief mate of ocean steam vessels all be eligible for examination after he has furnished satisfactory cumentary evidence to the local inspectors that he has had the llowing experience and is qualified in all other respects:

First. One year's service as second mate of ocean steam vessels of 00 gross tons or over; or,

Second. One year's service as second mate of coastwise steam ssels of 2,000 gross tons or over; or,

Third. Two years' service as officer in charge of a watch on ocean am vessels of 1,000 gross tons or over while holding a license as cond mate of such vessels; or, Fourth. Two years' service as officer in charge of a watch on co wise steam vessels of 2,000 gross tons or over while holding a lice as second mate of such vessels; or,

Fifth. Two years' service as master of lake, bay, or sound ste vessels of 1,000 gross tons or over, together with one year's servic officer in charge of a watch on ocean steam vessels of 1,000 gross t or over, or together with one year of such service on coastwise ste vessels of 2,000 gross tons or over; or,

Sixth. Five year's service in the deck department of ocean coastwise sail vessels of 200 gross tons or over, two years of s service shall have been as master of such vessels, for license as c mate of ocean freight or towing steam vessels of not more than 3, gross tons; or,

Seventh. One year's service as master of any class of ocean ste vessels of more than 250 gross tons for license as chief mate of oc freight or towing steam vessels of not more than 1,500 gross tons.

EXAMINATION FOR LICENSE AS CHIEF MATE OF OCEAN STEAM VESS

36A. An applicant for license as chief mate of ocean steam ves shall be required to pass a satisfactory examination as to his knowle of the following subjects:

1. Latitude by Polaris.
2. Latitude by reduction to meridian (sun or star).
3. Longitude by chronometer (sun or star).
4. Ship's position by lines of position.
5. Ship's position by dead reckoning.
6. Azimuth by altitude of sun or star.
7. Chart navigation.
8. Time of high water by tables.
9. Speed by engine revolutions.
10. Distance off a fixed object.
11. Change in draft due to change in density of water.
12. Signaling by semaphore.
13. Stowage.
14. International Code of Signals.
15. International Rules of the Road.
16. Life-saving apparatus.
17. Magnetism, with regard to a ship's compass.
18. Ocean winds and weather.
19. Instruments and accessories used in navigation.
20. Aids to navigation.
21. Seamanship.
22. Temporary repairs to hull and equipment.
23. Ship sanitation.
24. United States Navigation Laws.
25. Rules and Regulations of the Board of Supervising Inspect
26. Such further examination of a nonmathematical characte the local inspectors may require. (Sec. 4440, R. S.)

SECOND MATE OF OCEAN STEAM VESSELS.

37. Any applicant for license as second mate of ocean steam ves shall be eligible for examination after he has furnished satisfact

ocumentary evidence to the local inspectors that he has had the ollowing experience and is qualified in all other respects:

First. One year's service as third mate of ocean or coastwise steam essels; or,

Second. Five years' service in the deck department of ocean or oastwise steam vessels, two years of which shall have been as boatwain or quartermaster; or,

Third. A graduate who has served two years in the seamanship lass of a State nautical school ship and completed two ocean or oastwise cruises before graduation, together with two years' service n the deck department of an ocean or coastwise steam vessel of 500 ross tons or over: *Provided*, That where the graduate has completed he two cruises, but not the two years' service required, additional ervice equal to the difference in time shall be served on vessels of he class required for the probationary period of two years; or,

Fourth. Four years' service in the deck department of ocean or oastwise sail vessels of 200 gross tons or over; one year of such ervice shall have been as second mate of such vessels; or,

Fifth. Three years' service in the deck department of any ocean r coastwise sail vessel of 100 gross tons or over, together with one ear's service in the deck department of ocean or coastwise steam essels, for license as second mate of ocean or coastwise steam vessels f 1,000 gross tons or under; or,

Sixth. One year's service as master or first-class pilot of lake, ay or sound steam vessels of 500 gross tons or over, except ferry essels, together with one year's service in the deck department of cean or coastwise steam vessels of 1,000 gross tons or over, while olding a license as such master or first-class pilot; or,

Seventh. Two years' service as assistant (junior officer of the atch) to the officer in charge of the watch on ocean steamers while olding a license as third mate of such steam vessels. (Sec. 4440, . S.)

XAMINATION FOR LICENSE AS SECOND MATE OF OCEAN STEAM VESSELS.

38. An applicant for license as second mate of ocean steam vessels hall be required to pass a satisfactory examination as to his knowledge f the following subjects:

1. Latitude by meridian altitude of the sun or a star.
2. Longitude by sun or star.
3. Deviation of the compass by amplitude.
4. Deviation of the compass by azimuth tables.
5. Ship's position by dead reckoning.
6. Distance off a fixed object.
7. Chart navigation.
8. Mercator sailings.
9. Determination of area and volume.
10. Storm signals.
11. International Rules of the Road.
12. International Code of Signals.
13. Stowage.
14. Signaling by blinker.
15. Life-saving apparatus.
16. Instruments and accessories used in navigation.

17. Seamanship.
18. Nautical astronomy definitions.
19. Aids to navigation.
20. Rules and Regulations of the Board of Supervising Inspecto
21. Such further examination of a nonmathematical character the local inspectors may require. (Sec. 4440, R. S.)

THIRD MATE OF OCEAN STEAM VESSELS.

39. Any applicant for license as third mate of ocean steam ves shall be eligible for examination after he has furnished satisfact documentary evidence to the local inspectors that he has had following experience and is qualified in all other respects:

First. Three years' service in the deck department of ocean coastwise steam vessels; or,

Second. A graduate who has served two years' in the seamans class of a nautical school ship and completed two ocean or co wise cruises before graduation: *Provided,* That where the gradu has completed the two cruises, but not the two years' service requi additional service equal to the difference in time shall be served the deck department of ocean or coastwise steam vessels; or,

Third. Three years' service in the deck department of ocean coastwise sail vessels of 100 gross tons or over, together with year's service in the deck department of ocean or coastwise ste vessels. Service on such sail vessels engaged in the ocean or co wise fisheries shall be accepted as meeting the requirements of paragraph; or,

Fourth. One year's service as master or pilot of lake, bay or so steam vessels of 150 gross tons or over, except ferry vessels, toget with three months' service in the deck department of ocean or co wise steam vessels; or,

Fifth. Three years' service in the deck department of lake, b sound, or river steam vessels, together with one year's service in deck department of ocean or coastwise steam vessels; or,

Sixth. Two years' service as a licensed first-class pilot of ste vessels of 4,000 gross tons or over, except ferry vessels, on the G Lakes or other lakes, bays or sounds; or,

Seventh. Three years' service in the deck department of ste vessels of 100 gross tons or over engaged in the ocean or coast fisheries, together with six months' experience in the deck departm of ocean or coastwise steam vessels. (Sec. 4440, R. S.)

EXAMINATION FOR LICENSE AS THIRD MATE OF OCEAN STEAM VESS

40. An applicant for license as third mate of ocean steam ves shall be required to pass a satisfactory examination as to his kno edge of the following subjects:

1. Latitude by meridian altitude of the sun.
2. Longitude by chronometer.
3. Deviation of the compass by tables.
4. Ship's position by dead reckoning.
5. Middle latitude sailing.
6. Distance off by bearings and run.
7. Chart navigation.

8. International Rules of the Road.
9. Stowage.
10. Storm signals.
11. Sea terms.
12. Seamanship.
13. Instruments and accessories used in navigation.
14. Rules and Regulations of the Board of Supervising Inspectors.
15. Such further examination of a nonmathematical character as e local inspectors may require. (Sec. 4440, R. S.)

CHIEF MATE OF COASTWISE STEAM VESSELS.

41. An applicant for license as chief mate of coastwise steam essels shall be eligible for examination after he has furnished satisctory documentary evidence to the local inspectors that he has had e following experience and is qualified in all other respects:

First. One year's service as second mate of ocean or coastwise eam vessels of 1,000 gross tons or over; or,

Second. Two years' service as officer in charge of a watch on ean or coastwise steam vessels of 1,000 gross tons or over while olding license as second mate of ocean and coastwise steam vessels;
,

Third. One year's service as master or first-class pilot of lake, bay, sound steam vessels of 500 gross tons or over, except ferry vessels, ogether with twelve months' service as third mate of ocean or coastise steam vessels of 1,000 gross tons or over, while holding license s such master or first-class pilot; or,

Fourth. Two years' service as master or first-class pilot of lake, ay, or sound towing vessels for license as chief mate of coastwise owing vessels of 750 gross tons or under; or,

Fifth. One year's service as a licensed master or two years' service s a licensed mate on ocean or coastwise steam vessels of 250 gross ons or over engaged in the ocean or coastwise fisheries, for license s chief mate of coastwise freight or towing steam vessels of 1,000 ross tons or under; or,

Sixth. Five years' service in the deck department of any ocean r coastwise sail vessel of 100 gross tons or over, two years of such serve shall have been as master of such vessels, for license as chief mate f freight or towing steam vessels of 1,000 gross tons or under; or,

Seventh. Two years' service as first-class pilot, or two years' ombined service as master and first-class pilot of steam vessels of ,000 gross tons or over, except ferry vessels, on the Great Lakes nd other lakes, bays, and sounds, for license as chief mate of coastise vessels on routes not exceeding 300 miles. (Sec. 4440 R. S.)

XAMINATION FOR LICENSE AS CHIEF MATE OF COASTWISE STEAM VESSELS.

41A. An applicant for license as chief mate of coastwise steam essels on routes exceeding 600 miles shall be required to pass a tisfactory examination as to his knowledge of the following subjects:

1. Latitude by meridian altitude (sun or star).
2. Longitude by chronometer (sun or star).
3. Deviation of the compass by azimuth.
4. Ship's position by dead reckoning.

5. Distance off a fixed object.
6. Chart navigation.
7. Mercator sailings.
8. Determination of areas and volume.
9. Storm signals.
10. International Rules of the Road.
11. International Code of Signals.
12. Stowage.
13. Signaling by blinker.
14. Life-saving apparatus.
15. Instruments and accessories used in navigation.
16. Seamanship.
17. Nautical astronomy definitions.
18. Aids to navigation.
19. Rules and Regulations of the Board of Supervising Inspecto
20. Such further examination of a nonmathematical character the local inspectors may require.

An applicant for license as chief mate of coastwise steam vess on routes of 600 miles or less shall be required to pass a satisfacto examination as to his knowledge of the following subjects:

1. Chart navigation.
2. Distance off a fixed object by bearings and run.
3. International Rules of the Road.
4. Storm signals.
5. Aids to navigation on route.
6. Stowage.
7. Signaling by blinker.
8. Instruments and accessories used in navigation.
9. Rules and Regulations of the Board of Supervising Inspector
10. Such further examination of a nonmathematical character the local inspectors may require. (Sec. 4440, R. S.)

SECOND MATE OF COASTWISE STEAM VESSELS.

42. An applicant for license as second mate of coastwise stea vessels shall be eligible for examination after he has furnished sat factory documentary evidence to the local inspectors that he has h the following experience and is qualified in all other respects:

First. One year's service as third mate of ocean or coastwise stea vessels; or,

Second. Five years' service in the deck department of ocean coastwise steam vessels, two years of which shall have been as bo swain or quartermaster; or,

Third. Three years' service in the deck department of any oce or coastwise sail vessel of 100 gross tons or over, together with o year's service in the deck department of ocean or coastwise stea vessels, for license as second mate of coastwise steam vessels of n more than 750 gross tons; or,

Fourth. A graduate who has served two years in the seamansh class of a State nautical school ship and completed two ocean coastwise cruises before graduation, together with two years' serv in the deck department of ocean or coastwise steam vessels: *P vided*, That where the graduate has completed the two cruises, b not the two years' service required, additional service equal to t difference in time shall be served on ocean or coastwise steam vessels; or,

Fifth. One year's service as a licensed master or first-class pilot of lake, bay or sound steam vessels of 150 gross tons or over, except ferry vessels, together with one year's service in the deck department of ocean or coastwise steam vessels; or,

Sixth. One year's service as a licensed mate on ocean or coastwise steam vessels of 150 gross tons or over engaged in the fisheries, for license as second mate of towing vessels; or,

Seventh. Two years' service as assistant (junior officer of the watch) to the officer in charge of the watch on coastwise steamers, while holding a license as third officer of coastwise steamers; or,

Eighth. Two years' service as first or second-class pilot of steam vessels of 1,000 gross tons or over, except ferry vessels, on the Great Lakes and other lakes, bays, and sounds, for license as second mate of coastwise vessels on routes not exceeding 300 miles. (Sec. 4440, R. S.)

EXAMINATION FOR LICENSE AS SECOND MATE OF COASTWISE STEAM VESSELS.

43. An applicant for license as second mate of coastwise steam vessels on routes exceeding 600 miles shall be required to pass a satisfactory examination as to his knowledge of the following subjects:

1. Latitude by meridian altitude of sun.
2. Longitude by chronometer.
3. Deviation of the compass by tables.
4. Ship's position by dead reckoning.
5. Middle latitude sailing.
6. Distance off by bearings and run.
7. Chart navigation.
8. International Rules of the Road.
9. Stowage.
10. Storm signals.
11. Sea terms.
12. Seamanship.
13. Instruments and accessories used in navigation.
14. Rules and Regulations of the Board of Supervising Inspectors.
15. Such further examination of a nonmathematical character as the local inspectors may require.

An applicant for license as second mate of coastwise steam vessels on routes of 600 miles or less shall be required to pass a satisfactory examination as to his knowledge of the following subjects:

1. Chart navigation.
2. Distance off a fixed object by bearings and run.
3. International Rules of the Road.
4. Storm signals.
5. Aids to navigation on route.
6. Stowage.
7. Signaling by International Code of Signals.
8. Instruments and accessories used in navigation.
9. Rules and Regulations of the Board of Supervising Inspectors.
10. Such further examination of a nonmathematical character as the local inspectors may require. (Sec. 4440, R. S.)

THIRD MATE OF COASTWISE STEAM VESSELS.

44. An applicant for license as third mate of coastwise steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience and is qualified in all other respects:

First. Three years' service in the deck department of ocean or coastwise steam vessels; or,

Second. A graduate who has served two years in the seamanship class of a nautical school ship and completed two ocean or coastwise cruises before graduation: *Provided*, That where the graduate has completed the two cruises, but not the two years' service required, additional service equal to the difference in time shall be served in the deck department of ocean or coastwise steam vessels; or,

Third. Two years' service in the deck department of ocean or coastwise sail vessels of 100 gross tons or over, together with twelve months' service in the deck department of ocean or coastwise steam vessels. Service on such sail vessels engaged in the ocean or coastwise fisheries shall be accepted as meeting the requirements of this paragraph; or,

Fourth. One year's service as master or pilot of lake, bay, sound, or river steam vessels of 150 gross tons or over, except ferry vessels, together with six months' service in the deck department of ocean or coastwise steam vessels; or,

Fifth. Twenty-four months' service as a licensed first-class pilot of steam vessels of 2,500 gross tons or over, except ferry vessels, on the Great Lakes and other lakes, bays, or sounds; or,

Sixth. Three years' service in the deck department of ocean or coastwise steam or sail vessels of less than 100 gross tons, together with one year's service in the deck department of ocean or coastwise steam vessels; or,

Seventh. Two years' service in the deck department of lake, bay, or sound steam vessels, together with two years' service in the deck department of ocean or coastwise steam vessels; or,

Eighth. Two years' service in the deck department of steam vessels of 100 gross tons or over engaged in the ocean or coastwise fisheries, together with one year's service in the deck department of ocean or coastwise steam vessels. (Sec. 4440, R. S.)

EXAMINATION FOR LICENSE AS THIRD MATE OF COASTWISE STEAM VESSELS.

45. An applicant for license as third mate of coastwise steam vessels shall pass a satisfactory examination as to his knowledge of the following subjects:

1. Latitude by meridian altitude of sun.
2. Chart navigation.
3. Determination of distance off a fixed object.
4. International Rules of the Road.
5. Storm signals.
6. Signaling by blinker.
7. Instruments and accessories used in navigation.
8. Sea terms.
9. Rules and Regulations of the Board of Supervising Inspectors
10. Such further examination of a nonmathematical character as the local inspectors may require. (Sec. 4440, R. S.)

INDORSEMENT OF MASTER'S OR MATE'S LICENSE AS PILOT.

46. Whenever a master or mate desires to act in the double capacity of master and pilot, or mate and pilot, and furnishes the necessary evidence of his qualifications, the local inspectors shall indorse such pilot routes on the certificate of license. (Sec. 4443, R. S.)

LICENSE AS MASTER OF STEAM YACHT.

47. Whenever any person who has reached the age of 21 years, and who has had three years' experience in sailing steam or sailing yachts of over 100 gross tons, applies for a license authorizing him to act as master of steam yachts for coastwise and ocean navigation, the local inspectors shall examine the applicant as to his knowledge of the rules of the road, fog signals, signal lights (inland and international); the use of the lead and line; the use of the patent and chip logs, the compass, variation and deviation of the compass, the use of the drag, the use of oil during storms, bell signals between pilot house and engine room, handling of steam vessels, laws of storms, course and distance by chart, keeping the log book, middle latitude sailing, Mercator's sailing, method of obtaining latitude and longitude by dead reckoning, latitude by altitude of either the sun, moon, or stars; longitude by chronometer (time sights). Practical problems shall be given in the subjects of latitude and longitude. The examination shall be in writing, which shall be kept on file in the office of the local inspectors. If said examination is satisfactory to the local inspectors, they shall issue to the applicant a master's license authorizing him to discharge the duties of master of steam yachts, either for coastwise or ocean navigation. (Sec. 4439, R. S.)

MASTER, MATE, AND PILOT OF STEAM PILOT, FISHING, PORTO RICAN, AND HAWAIIAN VESSELS.

48. Any applicant for original license to act as master of steam pilot boats, or of steamers navigating the waters of the whaling grounds in the Alaskan seas, or of steamers engaged exclusively in the business of whale fishing, or of steamers engaged in the Atlantic, Pacific, or Gulf coast fisheries, or of steam or sail vessels navigating between ports of the Hawaiian Islands, or between ports of the island of Porto Rico, shall have had at least three years' experience in the deck department of such vessels, and except as hereinafter provided, for an original license as mate the applicant shall have had two years' experience in the deck department of such vessels, which fact shall be verified by documentary evidence; and such applicant shall only be subjected to such examination as shall satisfy the inspectors that the applicant is capable of navigating such vessels. *It is provided*, That any person who has had at least five years' experience on sail vessels licensed in the fisheries of the United States, two years of which have been as master or mate of such sailing vessels, may be examined for license as master or mate of steam fishing vessels to be employed exclusively in the Atlantic, Pacific, and Gulf coast fisheries. The license issued under this section shall state in the body thereof "for coastwise only," Pacific or Atlantic coast, as the case may be, and between what ports on either of said coasts.

It is further provided, That any applicant for original license who has had three years' experience in the deck department on steam pilot boats, or who has had two years' experience in the deck department on steam pilot boats and one year's experience on sail pilot boats, shall be eligible for examination for license as mate of steam pilot boats.

It is further provided, That said master's or mate's license may be indorsed as pilot on such inland waters on the above-named coasts as the local inspectors at the various ports may find the holder qualified to act on as pilot, after examination by the local inspectors, such examination to be in writing and preserved in the files of the inspector's office. (Secs. 4439, 4440, 4442, R. S.)

QUALIFICATIONS REQUIRED FOR LICENSE AS ENGINEER OF STEAM VESSELS AND LICENSE FORMS REQUIRED.

49. No person shall receive an original license as engineer or assistant engineer of steam vessels (except for license as engineer of sawmill boats and pile drivers propelled by steam, and except for special license as engineer of a steam vessel of any kind of 10 gross tons or under on which a licensed engineer is required) who has not served at least 36 months in the engineers' department of a steam vessel, except as hereinafter provided, a portion of which experience shall have been obtained within the three years next preceding the application.

No person shall receive license as above, except for special license, who is not able to determine the weight necessary to be placed on the lever of a safety valve (the diameter of valve, length of lever, distance from center of valve to fulcrum, weight of lever, and weight of valve and stem being known) to withstand any given pressure of steam in a boiler, or who is not able to figure and determine the strain brought on the braces of a boiler with a given pressure of steam, the position and distance apart of braces being known, such knowledge to be determined by an examination in writing, and the report of examination filed with the application in the office of the local inspectors, and no engineer or assistant engineer now holding a license shall have the grade of the same raised without possessing the above qualifications. No original license shall be granted any engineer or assistant engineer who can not read and write and does not understand the plain rules of arithmetic.

No person holding a special engineer's license shall be eligible for examination for a higher grade of license until such person has actually served two years under the authority of his license and one additional year in a subordinate capacity upon steamers requiring regularly licensed officers.

All licenses to engineers of steam vessels of 10 gross tons and under shall be issued on Form 876, special license to engineers of steam vessels of 10 gross tons and under, and all other licenses to engineers of steam vessels shall be issued on Forms 876 (chief engineer's license) and 877 (assistant engineer's license), according to grades of chief and assistant engineers specified.

Inspectors may designate upon the certificate of any chief or assistant engineer the tonnage of the vessel upon which he may act. (Secs. 4405, 4426, 4441, R. S.)

CLASSIFICATION OF ENGINEERS.

CHIEF ENGINEER OF OCEAN STEAM VESSELS.

50. An applicant for license as chief engineer of ocean steam vessels shall be eligible for examination after he has furnished the following documentary evidence to the local inspectors and is qualified in all other respects:

First. One year's service as first assistant engineer of ocean or coastwise steam vessels; or,

Second. Two years' service as second assistant engineer of ocean or coastwise steam vessels while holding license as first assistant engineer of such vessels; or,

Third. Two years' service as junior first assistant engineer of ocean or coastwise steam vessels while holding license as first assistant engineer of such vessels; or,

Fourth. One year's service as assistant engineer of ocean or coastwise steam vessels for license as chief engineer of ocean or coastwise steam vessels of not more than 750 gross tons. (Sec. 4440 R. S.)

FIRST ASSISTANT ENGINEER OF OCEAN STEAM VESSELS.

51. An applicant for license as first assistant engineer of ocean steam vessels shall be eligible for examination after he has furnished satisfactory documentary evidence to the local inspectors that he has had the following experience and is qualified in all other respects:

First. One year's service as second assistant engineer of ocean or coastwise steam vessels; or,

Second. One year's service as chief engineer or two years' service as first assistant engineer of Great Lakes and all other lake, bay or sound steam vessels of 1,000 gross tons or over, except ferry vessels, together with three months' service in the engine department of ocean or coastwise steam vessels; or,

Third. Two years' service as third assistant engineer of ocean or coastwise steam vessels while holding license as second assistant engineer of such vessels; or,

Fourth. Three years' service as oiler, water tender or fireman in the engine department of ocean or coastwise steam vessels, at least one year of such service shall have been as oiler or water tender, for license as first assistant engineer of steam vessels of not more than 750 gross tons; or,

Fifth. Two years' service as junior second assistant engineer while holding license as second assistant engineer of such vessels. (Sec. 4440 R. S.)

SECOND ASSISTANT ENGINEER OF OCEAN STEAM VESSELS.

52. An applicant for license as second assistant engineer of ocean team vessels shall be eligible for examination after he has furnished atisfactory documentary evidence to the local inspectors that he has had the following experience and is qualified in all other respects:

First. One year's service as third assistant engineer of ocean or oastwise steam vessels; or,

Second. One year's service as first assistant engineer or two years' ervice as second assistant engineer of Great Lakes and all other lake, bay, or sound steam vessels of 1,000 gross tons or over, except fer vessels; or,

Third. Five years' actual service in the engine department of ocean or coastwise steam vessel, four years of which shall have be as oiler or water tender; or,

Fourth. Three years' service as an apprentice to the machini trade and engaged in construction or repair of marine, stationary, locomotive engines, and one year's service as a journeyman machini engaged in the construction or repair of marine steam engine together with one year's service in the engine department of ocean coastwise steam vessels; or,

Fifth. Two years' service as junior third assistant engineer wh holding license as third assistant engineer; or,

Sixth. A graduate in mechanical or electrical engineering from duly recognized school of technology, together with one year's servi in the engine department of an ocean or coastwise steam vessel.

THIRD ASSISTANT ENGINEER OF OCEAN STEAM VESSELS.

53. An applicant for license as third assistant engineer of oce steam vessels shall be eligible for examination after he has had t following experience and is qualified in all other respects:

First. Four years' service as fireman on ocean or coastwise stea vessels; or,

Second. Three years' service as oiler, or water tender, or combin service of three years in these positions, on ocean or coastwise stea vessels; or,

Third. One year's service as second assistant engineer on Gre Lakes and all other lake, bay, or sound steam vessels; or,

Fourth. One year's service as chief or assistant engineer of riv steam vessels, together with six months' service in the engine depa ment of ocean or coastwise steam vessels; or,

Fifth. A graduate from the engineering class of a nautical scho ship, the term of such engineering class to be based upon a period two years, together with three months' service in the engine depa ment of ocean or coastwise steam vessels; or,

Sixth. Three years' service as an apprentice to the machinist tra and engaged in the construction or repair of marine, stationary, locomotive engines, together with one year's service in the engi department of ocean or coastwise steam vessels; or,

Seventh. A graduate in mechanical, marine or electrical enginee ing from a duly recognized school of technology together with thr months' service in the engine department of an ocean or coastwi steam vessel. (Sec. 4441, R. S.)

ENGINEERS OF MOTOR VESSELS.

54. The term "motor vessel" used in this and the following se tions shall include any vessel of above 15 gross tons, propelled by g fluid, naphtha, or electric motors.

No person shall receive an original license as engineer of mot vessels who has not served at least 36 months in the engine depa ment of a motor vessel, except as hereinafter provided, at least per cent of which service shall have been obtained within the thr years next preceding the application.

Inspectors may designate upon the certificate of any chief or assist-nt engineer the tonnage of the vessel upon which he may act. (Sec. 426 R. S.)

CHIEF ENGINEER OF MOTOR VESSELS.

55. An applicant for license as chief engineer of motor vessels hall be eligible for examination after he has furnished satisfactory ocumentary evidence to the local inspectors that he has had the ollowing experience and is qualified in all other respects:

First. One year's service as first assistant engineer of motor essels; or,

Second. Two years' service as second assistant engineer of motor essels, or two years' combined service as first and second assistant ngineer of motor vessels; or,

Third. One year's service as assistant engineer on motor vessels for cense as chief engineer of motor vessels of 750 gross tons and under; or,

Fourth. Any person holding a license as chief engineer of steam essels who has served at least three months as licensed first assistant ngineer of motor vessels; or,

Fifth. Any person holding license as chief engineer of steam vessels ho has served six months as oiler in the engine department of motor essels; or has been employed for not less than three months in the onstruction or installation of marine motor engines together with hree months' service as oiler in the engine department of motor essels; or,

Sixth. Any person who has served at least two years in the engine epartment of motor vessels, or has had at least one year's experience n the construction or installation of marine motor engines, together ith one year's service in the engine department of motor vessels, hall be eligible for examination for license as chief engineer of motor essels of not more than 300 gross tons. (Sec. 4426 R. S.)

FIRST ASSISTANT ENGINEER OF MOTOR VESSELS.

56. An applicant for license as first assistant engineer of motor essels shall be eligible for examination after he has furnished satisctory documentary evidence to the local inspectors that he has ad the following experience and is qualified in all other respects:

First. One year's service as second assistant engineer of motor ves-ls; or,

Second. Two years' service as third assistant engineer of motor essels, or two years' combined service as second and third assistant ngineer of motor vessels; or,

Third. Three years' service as oiler in the engine department of otor vessels, for license as first assistant engineer of motor vessels 750 gross tons and under; or,

Fourth. Any person holding a license as first assistant engineer of eam vessels, who has served at least three months as licensed cond assistant engineer of motor vessels; or,

Fifth. Any person who has served at least two years in the engine partment of motor vessels, or has had at least one year's experience the construction or installation of marine motor engines, together ith one year's service in the engine department of motor vessels, hall be eligible for examination for license as first assistant engineer motor vessels of not more than 300 gross tons. (Sec. 4426 R. S.)

SECOND ASSISTANT ENGINEER OF MOTOR VESSELS.

57. An applicant for license as second assistant engineer of mo vessels shall be eligible for examination after he has furnished sat factory documentary evidence to the local inspectors that he has h the following experience and is qualified in all other respects:

First. One year's service as third assistant engineer of mo vessels; or,

Second. Four years' service as oiler in the engine department motor vessels; or,

Third. A journeyman machinist who has served an apprentices for three years and engaged in the construction or repair of mar motor engines for at least two years of that time, together with year's service in the engine department of motor vessels as oiler; or,

Fourth. Any person holding a license as second assistant engin of steam vessels, who has served at least three months as licens third assistant engineer of motor vessels; or,

Fifth. Any person holding a license as second assistant engineer steam vessels, after having served as oiler in the engine department motor vessels for not less than six months or has been employed not less than three months in the construction or installation of engi for motor vessels, together with three months' service in the eng department of motor vessels; or,

Sixth. A graduate in mechanical or electrical engineering from duly recognized school of technology, together with six mont service as oiler on motor vessels. (Sec. 4426, R. S.)

THIRD ASSISTANT ENGINEER OF MOTOR VESSELS.

58. An applicant for license as third assistant engineer of mo vessels shall be eligible for examination after he has furnished sat factory documentary evidence to the local inspectors that he has h the following experience and is qualified in all other respects:

First. Three years' service in the engine department of motor v sels; or,

Second. A graduate from the engineering class of a nautical sch ship, the term of such engineering class to be based upon a period two years, after he has served at least six months as oiler on mo vessels, or has been employed at least six months in the constructi and installation of engines for motor vessels; or,

Third. Three years' service as an apprentice to the machinist tra and engaged in the construction or repair of marine, stationary locomotive engines, together with one year's service in the eng department of motor vessels as oiler; or,

Fourth. Two years' service as a locomotive or stationary engine together with two years' service as oiler on motor vessels; or,

Fifth. Any person holding a license as third assistant engineer steam vessels, after having served as oiler in the engine department motor vessels for not less than three months or has been employed not less than three months in the construction and installation engines for motor vessels. (Sec. 4426, R. S.)

EXAMINATION OF BOILERS AND MACHINERY BY ENGINEER.

59. It shall be the duty of an engineer when he assumes charge the boilers and machinery of a steamer to forthwith thoroug

examine the same, and if he finds any part thereof in bad condition, caused by neglect or inattention on the part of his predecessor, he shall immediately report the facts to the master, owner, or agent, and to the local inspectors of the district, who shall thereupon investigate the matter, and if the former engineer has been culpably derelict of his duty they shall suspend or revoke his license. (Sec. 4441, R. S.)

REPORTS OF ACCIDENTS, REPAIRS, AND UNSAFE BOILERS AND MACHINERY BY ENGINEERS.

60. Before making repairs to a boiler of a steam vessel the engineer in charge of such steamer shall report, in writing, the nature of such repairs to the local inspectors of the district wherein such repairs are to be made.

And it shall be the duty of all engineers when an accident occurs to the boilers or machinery in their charge tending to render the further use of such boilers or machinery unsafe until repairs are made, or when, by reason of ordinary wear, such boilers or machinery have become unsafe, to report the same to the local inspectors immediately upon the arrival of the vessel at the first port reached subsequent to the accident or after the discovery of such unsafe condition by said engineer. (Sec. 4441, R. S.)

FUSIBLE PLUG REPORT.

61. It shall be the duty of the chief engineer of any steam vessel under the jurisdiction of the Steamboat Inspection Service to report promptly to the local inspectors who made the last annual inspection of such steam vessel every renewal of every fusible plug inserted in a boiler or boilers of the steam vessel upon which he is in charge as chief engineer. Such report shall be made upon the form provided for such purpose (or by letter in writing) setting forth:

1. Name of steamer and gross tonnage thereof.
2. Date fusible plug or plugs were inserted in boiler or boilers.
3. Number of boilers in steamer.
4. Description of boiler or boilers in the steamer (manufacturer's number on boiler, by location or otherwise, so that boiler may be identified; and, if a fusible plug is inserted in the crown sheet of a separate combustion chamber, the location of combustion chamber should be stated).
5. Name of the manufacturer of the fusible plugs.
6. Manufacturer's mark on casing of fusible plugs.
7. Heat number on both ends of filling of fusible plugs.
8. Diameter of filling at smaller end of fusible plugs.
9. Steam pressure allowed to boiler by last certificate of inspection.
10. Number of such fusible plugs inserted.
11. Length of time that removed plugs have been in service.
12. If the length of time that a fusible plug has been installed in a boiler exceeds six months, state the length of time that the steamer has been out of service and boiler not in use since the removed plug was placed in boiler, and under "Remarks" such other information as may be of interest and value to the inspectors of the Steamboat Inspection Service.

Neglect of the chief engineer of a steamer to give this matter prompt attention may result in the suspension or revocation of his license. (Secs. 4405, 4417, R. S.)

Rule VI.—Inspection of Vessels.

1. The annual inspection of any vessel subject to the provision of Title LII, Revised Statutes of the United States, shall be mad only on written application, presented to the United States loca inspectors by the owner, master, or authorized agent of the vesse to be inspected. Such application shall state upon its face tha previous application for inspection has not been made to any othe board of local inspectors or supervising inspector. (Sec. 4417, R. S.

2. Steam vessels employed by the Government, unless the title of the same are actually vested in the United States, are not exemp from inspection. (Sec. 4400, R. S.)

3. Inspectors may lawfully inspect within their respective districts, upon proper application, any vessel running upon the water of their district the certificate of which is about to expire. (Sec 4417, R. S.)

4. In the inspection of hulls of vessels, the inspector of hulls shal carefully inspect every accessible part of the hull, and carefull examine the wood or metal of which the hull is constructed, to determine the condition of same, making all necessary hammer tests o hulls constructed of iron or steel. If the inspector shall not hav satisfactory evidence otherwise of the soundness of the hull of wooden vessel, he shall not give a certificate until the same shall b bored or opened up to his satisfaction.

All scupper, sanitary, and other similar discharges which lea through the ship's hull shall be fitted with efficient means for preventing the ingress of water in the event of a fracture of such pipes.

The requirements of the above paragraph do not apply to the discharges in the machinery space connected with the main and auxiliary engines, pumps, etc.

All scupper, soil, and sanitary pipes shall be adequately protected casings to be substantial and so fitted to be conveniently remove for the purpose of examination.

The outboard shaft or shafts on every ocean or coastwise vesse shall be drawn for examination once at least in every three years (Secs. 4405, 4417, R. S.)

5. Whenever any vessel is placed upon the dock for repairs it shal be the duty of the master, owner, or agent to report the same to th board of local inspectors of that district, so that a thorough inspection may by them be made to determine what is necessary to mak such vessel seaworthy if the condition or age of the vessel, in th judgment of the inspectors, renders such examination necessary.

No repairs or alterations affecting the safety of the vessel, eithe in regard to hull or machinery, shall be made without the knowledg of the local inspectors. Drawings or prints of such alterations shal be furnished, in duplicate, to the local inspectors having jurisdiction one copy of which shall be forwarded to the Supervising Inspecto General. Notice of such repairs and changes is necessary, even i such work does not require the vessel to be placed in a dry dock, an even if there are no licensed officers attached to the vessel. (Sec 4417, R. S.)

6. Certificates of inspection signed by one local inspector only shal not be valid, nor shall the name of a regular inspector be substitute

by that of any other person upon any such certificate. This rule also applies to licenses. (Sec. 4421, R. S.)

7. Certificates of inspection for any period less than one year shall not be issued, but nothing herein shall be construed as preventing the revocation or suspension of certificates of inspection, in case such process is authorized by law.

Local inspectors issuing a permit to any vessel to proceed to other ports for repairs shall state upon the face of the same the conditions upon which it is granted and whether the vessel is to be allowed to carry freight or passengers, the quantity and number: *Provided, however,* That no vessel whose certificate had *expired* shall be permitted to carry passengers or freight while en route to another port for repairs.

When, under section 4456, Revised Statutes of the United States, vessels obtain a permit from the local inspectors of a district to go from their district to another to make repairs, said local inspectors shall notify the supervising inspector of their district, stating the repairs to be made on said vessels. The supervising inspector shall notify the supervising inspector of the district where such repairs are to be made, furnishing him a copy of the report of the inspectors indicating the repairs ordered on said vessels. (Secs. 4421, 4453, 4456, R. S.)

8. On and after July 1, 1930, the owner or builder of every new vessel of over 100 gross tons, before making application for first inspection of the vessel, shall furnish the local inspectors of the district where the vessel is to be inspected drawings or prints, as follows: Sheer, half breadth and body plans, midship section, inboard profile, arrangement of decks and hatch details, capacities of double bottoms and fuel compartments, and such other drawings or prints showing fully the general construction of the vessel (of iron, steel, or wood), including dimensions, spacing of frames, disposition of hull plates, of outside planking and inside ceiling, details of principal scarfs, construction of transverse and longitudinal bulkheads, and location of same.

The drawings or prints and description of the vessel shall be furnished in duplicate to the local inspectors making the first inspection, one copy of which shall be forwarded to the Supervising Inspector General.

All vessels of 50 gross tons and over, under the jurisdiction of the Steamboat Inspection Service, shall have the draft of the vessel plainly and legibly marked upon the stem and upon the sternpost or rudderpost or at such other place at the stern of the vessel as may be necessary for easy observance. The draft shall be taken from the bottom of the lowest part of the keel to the surface of the water, the bottom of the mark to indicate the draft in feet. (Secs. 4405, 4417, R. S.)

9. On all vessels contracted for after June 30, 1928, using electricity for any purpose, the installation shall be in keeping with the best modern practice.

Wires shall be armored or run in approved iron conduits or moldings.

Iron conduit or armored casing shall be required in bunkers, cargo spaces, storerooms, etc., and in all places where the leads are liable to mechanical injury. Joints in wiring shall be avoided as far as possible in the above-named spaces, and where joints are necessary they shall be made in metal boxes, readily accessible and protecte in the same manner as the leads.

When wires are led through beams, frames, or nonwater-tigh bulkheads, they shall be carried either in iron conduits, armore casing, or protected by hard rubber, or other equivalent bushings.

When wires are carried through water-tight decks or bulkheads they shall be provided with a suitable stuffing box at deck or bulk head. Where such points are liable to mechanical injury, they sha be protected by suitable boxes or cages.

In locating the wiring system as a whole, care shall be taken t provide accessibility for examination and repair. Special care sha be taken to avoid any arrangement which might permit the lodgmen of standing water, and when necessary, openings in conduits or drain shall be installed to accomplish this purpose.

All fixtures, taps, joints, and splices shall be fitted with meta boxes. Boxes in cargo and machinery spaces, galley, and thos exposed to weather shall be water-tight.

Splices shall be so joined as to be both mechanically and electricall secure without solder. They shall then be soldered and properl insulated and further protected by waterproof tape.

Changes or alterations in the electrical installations of vessels no in service shall be in accordance with this rule.

Special attention shall be given by the inspectors in the exami nation of present installation to see that it is of such nature as t preclude any danger of fire, giving particular attention to wirin which is carried through wooden bulkheads, partitions, etc. (Secs 4405, 4417, R. S.)

10. On and after July 1, 1920, all steamers of the United State subject to the regulations of this Service, engaged in the passenge service, which are electrically lighted by dynamos located below th deep-load line of the vessel shall have on board an auxiliary lightin system located above the deep-load line to light the steamer suffi ciently to enable passengers and crew to find their way to the exits which auxiliary lighting system shall be ready for use in case o failure of the main lighting plant and to be so installed and arrange that all auxiliary lights may be switched on from a central station Where such auxiliary lights are served by storage batteries, arrange ments shall be such that the auxiliary lights and alarm bells will b put in service separately or together by one operation from the pilo house or navigator's bridge: *Provided, however,* That where oil lamp are used as auxiliary lights, such oil lamps shall be kept lighte between the hours of sunset and sunrise while such vessels to whic this section applies are being navigated, or while passengers are o board: *Provided further,* That cabin watchmen and cabin patrols o duty in the nighttime on all vessels with staterooms to which thi section applies shall have in their possession while on such patro duty a suitable and efficient dry-battery flash light.

11. Steamers using the bell signals between the pilot house an engine room shall have a tube, of proper size, so arranged as to retur the sound of the bell signals to the pilot house, and shall also be pro vided with a speaking tube or other device for the purpose of conver sation between pilot house and engine room.

Nothing in the above shall be construed to prevent the use of th so-called telegraph now in use for conveying signals from the pilo house to the engine room, but in all cases where the telegraph is used the signal shall be repeated back.

On all steamers where the distance is more than 150 feet between deck houses, a wire cable shall be stretched between the deck houses at all times when the vessel is loaded and being navigated, this cable to be not less than 5 feet from the deck; and there shall be attached at all times to the cable a traveler with a line of sufficient continuous length to insure its operation, in order that communication between both ends of the vessel may be facilitated at all times: *Provided*, That, in addition to the traveler with the endless whip, as many loose rings with lanyards attached may be placed on the cable as may be deemed necessary by the master in charge of the vessel. Failure to have such cable stretched and traveler attached at all times when the vessel is loaded and being navigated shall be sufficient cause for the suspension of the license of the master or officer in charge.

On all steamers where the distance is more than 150 feet between perpendiculars of pilot house and forward part of the engine room there shall be communication by means of a telephone between the pilot house and engine room, such telephone to be installed in lieu of a speaking tube. (Secs. 4405, 4417, R. S.)

12. Inspected motor vessels shall be provided with an efficient whistle sounded by steam or by some substitute for steam to give the necessary whistle signals. (Sec. 4405, R. S.)

13. The efficient fog bell required upon vessels by law shall be held to mean a bell not less than 8 inches in diameter from outside to outside and constructed of bronze or brass or other material equal thereto in tone and volume of sound, and located where the sound shall be the least obstructed. (Sec. 4405, R. S.)

14. In the inspection of hulls, boilers, and machinery of vessels, the rules promulgated by the American Bureau of Shipping respecting material and construction of hulls, boilers, and machinery, and the certificate of classification referring thereto, except where otherwise provided for by these rules and regulations, shall be accepted as standard by the inspectors of this service. (Secs. 4405, 4417, R. S.)

15. Sixty copies of all blue prints and (or) specifications of every article approved after July 1, 1927, for use on vessels subject to nspection shall be supplied to the Supervising Inspector General for the use of supervising and local inspectors. (Sec. 4405, R. S.)

16. No lifeboat, lifeboat-disengaging apparatus, life raft, life preserver, fire extinguisher, fire-extinguishing apparatus, or other equipment required to be approved by Title LII, Revised Statutes, shall be used on any vessel inspected and certificated by this service which shall not first be approved by the Board of Supervising Inspectors and also by the Secretary of Commerce. (Sec. 4491, R. S.)

RULE VII.—DUTIES OF INSPECTORS.

1. Increases in the passenger allowance of any vessel, whether pecified in regular certificate or by excursion permit, may be allowed only after personal inspection of the vessel by the local inspectors, or by the supervising inspector if he grants the increase, who shall be satisfied that the vessel and her equipment justify the additional allowance, and of which inspection a written record shall be made and kept in the files of the office granting the allowance and a copy

thereof forwarded to the office of the Supervising Inspector General. (Sec. 4466, R. S.)

2. No supervising inspector shall make his annual report public until after the same has been printed and made public by the department; and, further, no local board, or the clerk thereof, shall make public any report without the consent of their supervising inspector or that of the Supervising Inspector General. (Sec. 4410, R. S.)

3. It shall be the duty of the supervising inspectors to inform their respective local boards, in writing, of their decisions in cases of appeal. Supervising inspectors granting license to a vessel engaged in towing to carry persons in addition to its crew, under the act approved February 23, 1901, shall notify the local inspectors in whose jurisdiction the steamer receiving the permit is engaged, and the local inspectors shall keep a record of the same.

It shall be the duty of local inspectors to notify the local inspectors of adjoining districts, through the supervising inspector, of all revocations or suspensions of licenses, and also of the names of all persons from whom licenses have been withheld, the names of all steam vessels neglecting or refusing to make repairs when ordered, and the names of all that have been refused certificates, with the reasons therefor. (Secs. 4411, 4427, R. S.)

4. Whenever any inspector shall find it necessary, in conducting his investigations or in the performance of any of his duties, to obtain testimony from the inspectors of other districts, he shall request the same through the supervising inspector. (Sec. 4405, R. S.)

5. Inspectors, at their annual inspections of steam boilers, may cause to be removed from the surface of such boilers as are covered so much of said covering as may be necessary to enable them to examine parts of the boilers which can not be properly examined from the inside, and shall examine in a thorough and careful manner, when practicable, either externally or internally, all parts of the shell of every boiler; and the masters, engineers, and owners of every steam vessel shall afford every facility necessary to carry out in the most effective and efficient manner the provisions of this section, and in no case shall an intermediate inspection be deemed any part of the regular annual inspection. (Secs. 4405, 4418, R. S.)

6. It shall be the duty of inspectors when inspecting or reinspecting a vessel to carefully examine all steam pipes passing through woodwork, and if in their judgment the same are deemed unsafe they shall have them provided with air space and fitted with metal collars. (Secs. 4405, 4418, R. S.)

7. It shall be the duty of the inspector who inspects the boilers of any steamer to actually enter the boiler or boilers where it is possible to do so, and to thoroughly examine the interior of all such boilers to see that the braces are in place and of proper size, and to determine whether the boilers are in good condition, before granting a certificate of inspection, such examination to be made after the hydrostatic pressure has been applied. A record shall be made in the boiler inspector's report of inspection showing whether or not the inspector did actually enter the boiler, and if he did not enter the boiler, he shall give his reasons for not entering it. (Secs. 4405, 4418 R. S.)

8. It shall also be the duty of the inspectors to compel all floating structures, such as steam elevators (propelled by their own motive

power), to have their whistles located on the front side of such superstructures having an elevation higher than the pilot house of the vessels. (Sec. 4405, R. S.)

9. All steam whistles shall be placed not less than 6 feet above the top of the pilot house of steam vessels where the height of the smokestack will admit the attachment of same below its top, when not hinged for passing under bridges, except upon steamers navigating the Red River of the North, Yukon and similar rivers, and rivers whose waters flow into the Gulf of Mexico, and steamers of less than 100 gross tons, whose steam whistles shall be placed not less than 2 feet above the tops of their pilot houses; and all double-end ferry steamers, and steamers similarly constructed, shall have a steam whistle both fore and aft of the smokestack, or one steam whistle on either the starboard or port side of the smokestack, so that the steam, when whistle is blown, can be seen from either end of steamer; and it shall be the duty of inspectors to enforce this rule at the annual inspection. (Sec. 4405, R. S.)

10. It shall be the duty of both the hull and boiler inspectors to be present when the boiler is being tested by hydrostatic pressure, and the hull inspector, as well as the boiler inspector, shall observe and note the indication upon the gauge.

It shall also be the duty of both the hull and boiler inspectors to examine all pumps, hose, and other fire apparatus and to see that the hose is subjected to a pressure of 100 pounds to the square inch, and that the hose couplings are securely fastened in accordance with these rules.

It shall be the duty of the local inspectors to require all ocean passenger or freight steamers of 500 gross tons and upward, except paddle-wheel steamers, to be equipped with an efficient mechanical deep-sea sounding apparatus, in addition to the ordinary deep-sea hand lead. The mechanical deep-sea sounding apparatus above required shall be installed, kept in working order, and ready for immediate use. (Secs. 4405, 4417, 4418, R. S.)

11. Local boards shall report forthwith to their supervising inspectors in detail all accidents of a serious character—such as collisions, founderings, sinkings, fires—and all other casualties of interest to or affecting the steamboat service in their respective districts. (Sec. 4405, R. S.)

12. Local inspectors shall report, for each fiscal year, as soon as practicable after the end of each fiscal year, to their supervising inspectors, all vessels inspected, arranged according to class and grade; all examinations into alleged violations of the laws regulating vessels, and the action taken in relation to the same; all investigations and decisions by local inspectors; all cases of appeal and the result thereof; casualties and investigations of same; the names of all persons licensed; the names of all whose licenses have been suspended or revoked; the names of all persons from whom licenses have been withheld; and shall render all other annual reports required by the regulations of the Department. These reports, together with any other annual reports that may be submitted by supervising and local inspectors, shall be forwarded by supervising inspectors to the Supervising Inspector General. (Secs. 4410, 4411, R. S.)

13. When it is known or comes to the knowledge of the local inspectors that any steam vessel is or has been carrying an excess

of steam beyond that which is allowed by her certificate of inspection, the local inspectors in whose district said steamer is being navigated, in addition to reporting the fact to the United States district attorney for prosecution under section 4437, Revised Statutes of the United States, shall require the owner or owners of said steamer to place on the boiler of said steamer a lockup safety valve that will prevent the carrying of an excess of steam and shall be under the control of said local inspectors.

On the placing of a lockup safety valve upon any boiler, it shall be the duty of the engineer in charge of same to blow or cause the said valve to blow off steam at least once in each watch of six hours or less, to determine whether the valve is in working order, and it shall be the duty of the master of such vessel to see that this rule is observed, and it shall be the duty of the master and engineer to report to the local inspectors any failure of such valve to operate.

In case no such report is made, and a safety valve is found that has been tampered with or out of order, the license of the engineer having such boiler in charge and the license of the master of such vessel shall be suspended or revoked.

It shall be the duty of the local inspectors to send a copy of this rule to every steamer in their district when said copies are furnished by the Department. (Secs. 4418, 4437, R. S.)

14. All official records and official documents on file in the office of any supervising inspector or board of local inspectors, after official action thereon has been concluded, may be open to public inspection and examination: *Provided*, That such inspection or examination be made in the office to which such official records and documents belong. (Sec. 4405, R. S.)

15. It shall be the duty of the inspectors when inspecting or reinspecting a vessel to see that all exposed and dangerous places such as gears and machinery, are properly protected with covers, guards, or rails, in order that the danger of accidents may be minimized, and on vessels equipped with radio (wireless) the lead-ins shall be efficiently incased or insulated to insure the protection of persons from accidental shock. Such lead-ins shall be located so as not to interfere with the launching of lifeboats and life rafts. (Secs. 4405, 4417, R. S.)

16. When inspectors have any reason to question the stability of any vessel under their jurisdiction, they shall require the owners of the vessel to make inclining tests on such vessel, under the supervision of the Supervising Inspector General.

On and after July 1, 1924, every passenger or ferry vessel of 500 gross tons or over, propelled by machinery, and every passenger or ferry vessel intended to carry 50 or more passengers, in either case when making application for first inspection to carry passengers shall be subjected to an inclining test conducted under the supervision of the Supervising Inspector General, and the results of the test shall be approved before the vessel shall be certificated.

The owner or builder of every vessel described in the second paragraph of this section shall, as soon as possible, furnish the local inspectors of the district where the vessel is to be inspected drawings or blue prints, as follows: Sheer, half breadth and body plans, midship section, inboard profile, floors, framing, bulkheads, arrangement of decks and quarters; general arrangement and location of boilers and

achinery, plan and elevation; plan and elevation sections through
olds, tanks, bunkers, double bottoms, and compartments; capacity
lan of the bunkers, tanks, holds, double bottoms, and compart-
ents; and the following curves: Displacement, vertical center of
uoyancy, transverse metacenter, longitudinal center of buoyancy,
ngitudinal metacenter, center of gravity of water planes from either
erpendicular, moment to alter trim, and tons per inch; except for
ouble-end ferry boats, then the drawing or blue print of curves will
nly be required to show the displacement, vertical center of buoy-
ncy, transverse metacenter, and tons per inch. The drawings and
lue prints required by this paragraph shall be forwarded, upon
eceipt of same, by the local inspectors to the Supervising Inspector
eneral.

Where vessels are required to carry fixed ballast, in order to
crease the metacentric height, such ballast shall not be moved
xcept for examination and repair of vessel, and then only in the
resence of an inspector of this Service.

The local inspectors shall place a notation in regard to the inclining
ata on the upper right-hand corner of the certificate of inspection
f every vessel subject to this rule, to read as follows: Data relating
o the stability of this vessel is on file in the office of the Supervising
nspector General, Washington, D. C. (Sec. 4405, R. S.)

17. It shall be the duty of the inspectors when inspecting or
einspecting vessels to carefully examine all air ports and deadlights
n the hull, and to satisfy themselves that the same are safe. (Secs.
405, 4417, R. S.)

18. It shall be the duty of the inspectors when inspecting or
einspecting vessels to carefully examine the lifeboat-disengaging
pparatus and the blocks and falls thereof and to satisfy themselves
hat the same are in good condition, and, further, that they shall
dicate in Form 840–A at annual inspection the name and record of
ll lifeboat-disengaging apparatus found, and, if unable to identify
uch lifeboat-disengaging apparatus by name, they shall within a
easonable time take the matter up with the supervising inspector
f the district in order that such apparatus may be traced for identifi-
ation and approval record. (Secs. 4405, 4417, R. S.)

RULE VIII.—OCEAN AND COASTWISE STEAM YACHTS.

(Authority: Sections 4405 and 4488, R. S. and Seamen's Act.)

CLASSES.

1. Ocean and coastwise steam yachts shall be divided into the
ollowing classes:

(a) Steam yachts navigating more than 20 nautical miles offshore.
(b) Steam yachts navigating 20 nautical miles or less offshore.

LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (a).

2. Vessels of class (a) shall be required to have lifeboat and
fe-raft capacity for all persons on board. Not less than 75 per cent
f the total capacity shall be in lifeboats and 25 per cent may be in
ollapsible lifeboats or rafts of an approved type.

LIFEBOATS AND LIFE RAFTS REQUIRED ON VESSELS OF CLASS (b).

3. Vessels of class (b) shall be required to have lifeboat and life-ra capacity to accommodate all persons on board. Not less than per cent of the total capacity shall be in lifeboats and 25 per cent ma be in approved collapsible lifeboats or life rafts.

Vessels of class (b) during the interval between May 15 and Octob 15 in any one year, both dates inclusive, shall only be required to equipped with lifeboats and life rafts to accommodate 70 per cent all persons on board, not less than 50 per cent of which shall be lifeboats and 50 per cent may be in collapsible lifeboats or life raf of an approved type.

SIZE OF LIFEBOATS.

4. The size of lifeboats on vessels of classes (a) and (b) shall be at least 125 cubic feet capacity. The supervising inspector of the di trict in which the vessel is inspected may, if he deems it prope modify the requirements as to the size of lifeboats.

AIR TANKS.

5. All lifeboats on vessels of class (a) shall be provided with a tanks. The construction and arrangement shall be as required section 30, Rule III, Ocean: *Provided*, That when motor lifeboa are subdivided with a suitable number of efficient bulkheads, the a tanks may be dispensed with.

6. Only the metal lifeboats on vessels of class (b) shall be require to be provided with air tanks.

CARRYING CAPACITY OF LIFEBOATS.

7. The carrying capacity of lifeboats on vessels of classes (a) an (b) shall be computed as provided in section 15, Rule III, Coastwis

DAVITS OR CRANES.

8. Lifeboats shall, when practicable, be carried under substanti davits or cranes.

MARKING OF LIFEBOATS.

9. Each lifeboat shall be provided with a suitable name board, the name of the vessel shall be marked on the bow or stern of th lifeboat.

EQUIPMENT FOR LIFEBOATS.

10. Only lifeboats of more than 180 cubic feet capacity are require to be equipped as provided in section 9, Rule III, Coastwise. Th equipment may be kept on board the steamer ready for use.

DRAWINGS, SPECIFICATIONS, NAME PLATE.

11. All lifeboats shall be substantially constructed in accordan with drawings, or blue prints, and specifications approved by the supe vising inspector of the district in which the lifeboats are built.

Builders of lifeboats shall affix a plate or other device to each lif boat, having thereon the builder's name, number of boat, date construction of boat, cubical contents of boat, and number of perso said boat will carry, as determined by the rules of the Board Supervising Inspectors.

INSPECTION OF LIFEBOATS WHEN BUILT.

12. Supervising inspectors of districts where lifeboats are built iall detail an assistant or local inspector to any place where lifeboats re being built, whose duty it shall be to carefully inspect and examine ie construction of such lifeboats, and he shall satisfy himself that ich lifeboats are constructed in accordance with the drawings, or ue prints, and specifications furnished by the builders. When the ssistant or local inspector approves the construction of the boat he iall stamp his initials, together with letters "U. S. I." on a blank ace on the plate required to be affixed to the boat by the builder. he initials of the assistant or local inspector shall be satisfactory vidence to all parties interested that the boat has been constructed accordance with the drawings, or blue prints, and specifications n file.

LIFE PRESERVERS.

13. These vessels shall be equipped with an approved life preserver r each person on board.

FIRE APPARATUS.

14. Pleasure steamers shall be provided with at least one double-ting steam fire pump.

Fire mains shall be led from the pumps to all decks with a sufficient umber of outlets arranged so that all parts of the vessel may be ached with water.

Suitable hose with nozzles and spanners shall be provided, but it iall not be necessary that the hose be coupled to hydrants, but shall e convenient to the hydrants in case of fire.

FIRE BUCKETS, AXES, AND FIRE EXTINGUISHERS.

15. Fire buckets, axes, and fire extinguishers shall be provided in cordance with the tables in Rule IV.

LIFE BUOYS.

16. Steam yachts shall be equipped with ring buoys with attached lf-igniting water lights as provided for passenger steamers of corre-onding length.

INSPECTION.

17. The inspection of hulls, boilers, and appurtenances thereto shall e strictly in compliance with the United States Revised Statutes and ie rules and regulations.

RULES OF PRACTICE IN INVESTIGATIONS AND TRIALS.

ules of Practice for the Government of Local Inspectors, Steamboat Inspection Service, in Investigations of Casualties to Vessels Under the Jurisdiction of the Steamboat Inspection Service and of Violations of Law or of the Rules and Regulations Thereunder by Licensed Officers.

1. When it has come to the knowledge of any board of local spectors that an accident has occurred within its district to a essel under the jurisdiction of the Steamboat Inspection Service ch board shall at once investigate the conditions and circum-ances under which the accident occurred, unless the Supervising spector General directs that the investigation be conducted by me other board of local inspectors than that of the district in hich the accident occurred.

2. In conducting the investigations referred to in section 1 the oard of local inspectors shall by personal observation or by the stimony of witnesses determine, so far as may be possible, the sponsibility of any licensed officer for the accident. If it is con-uded that no licensed officer is responsible, the investigation may e closed and the case dismissed; but if any licensed officer be con-uded to be responsible, the board of local inspectors shall im-ediately prefer charges against him and cite him to trial under the arges.

3. In cases where complaint or charges have been filed by any erson against a licensed officer no investigation is necessary, and e board of local inspectors shall immediately cite the defendant trial under the charges as preferred, and the trial shall determine e guilt or innocence of the defendant.

ules of Practice for the Government of Supervising and Local Inspectors, Steamboat Inspection Service, in Trials of Licensed Officers of Vessels.

I. SUSPENSION AND REVOCATION OF LICENSES.

1. The inspectors shall, when the charges have been duly filed gainst a licensed officer of vessel, furnish the accused with a copy ereof, setting forth specifically their character and the section of e statutes or the rules of the board that have been violated, and te him to appear for trial upon a certain day.

2. Subpœnas shall be in the prescribed form, one copy of which all be furnished each witness.

3. All testimony shall be reduced to writing. The accused shall permitted to be represented by counsel and to cross-examine itnesses, and in case of exceptions to questions for any cause the spectors shall note the exceptions in the margin of the deposition.

The deposition shall be sworn to before an officer authorized to administer oaths.

4. The accused may have the hearing of the case continued upon the presentation of reasons satisfactory to the board, and the board may, in like manner, continue the hearing from day to day.

5. During the trial the witnesses shall be examined separately, but if the accused is also a witness he shall not be subject to this rule.

6. At any time before the conclusion of the evidence the charge or charges, if being tried on charges, may be amended, notice of said amendment being furnished to the accused of the nature of such amendment, but no amendment shall be permitted after the conclusion of the evidence.

7. Where the witnesses reside in a district other than that in which the accused is being tried, a certified copy of the charges, together with such interrogatories as the inspectors desire to propound, may be forwarded to the inspectors of the district where the witnesses reside, and said inspectors shall examine the witnesses in the same manner as prescribed in section 3 of this rule.

8. The testimony thus taken shall be forwarded to the inspectors investigating the case and read as evidence in the cause, the same as though such testimony had been taken by the inspectors trying the same.

9. The inspectors shall furnish the accused with a statement in writing of their finding in the premises.

10. A copy of testimony taken at a trial by any board of local inspectors shall be given to the accused or his representative when request for same is made. (Secs. 4448, 4449, 4450, R. S.)

II. APPEAL TO SUPERVISING INSPECTORS.

1. The supervising inspector, upon notice of an appeal from the decision of the local board, provided said notice of appeal shall be made within 30 days from the date of the decision of the local board, shall give notice in writing to said local board to forward a certified copy of their decision, together with the charges and all evidence in writing on file in their office.

2. The supervising inspector shall then proceed to investigate the case under the same rules prescribed for the trial of the accused by the local board.

3. The testimony taken before the local board may be considered by the supervising inspector for the purpose of determining whether the finding of the local board is justified by the evidence, and he shall have power to remand the same for explanation or correction.

4. Upon the conclusion of the case the supervising inspector shall furnish the appellant with a notice of his finding in like manner as prescribed for local inspectors. (Act of Congress approved June 10, 1918.)

III. APPEAL TO SUPERVISING INSPECTOR GENERAL.

1. The Supervising Inspector General, upon notice of appeal from the decision of the supervising inspector, provided said notice of appeal shall be made within 30 days from the date of the decision of the supervising inspector, shall proceed to review the case under the same procedure as that of the supervising inspector in cases of appeal,

and the decision of the Supervising Inspector General in such cases shall, when approved by the Secretary of Commerce, be final. (Act of Congress approved June 10, 1918.)

IV. PUBLICITY IN HEARINGS AT INVESTIGATIONS AND TRIALS.

1. All hearings at investigations and trials shall be open to the public generally and to all who may be interested: *Provided, however,* That in the investigation of a case, and the conducting of a trial or trials resulting therefrom, involving a vessel of a foreign country, where for any reason whatever the officers of such foreign vessel refuse to testify in connection therewith, the local inspectors shall have authority to exclude them, as well as their representatives, from all hearings in connection with the case; and, further, they shall have authority to withhold from such person or persons a copy of the record.

2. At such hearings the principals may be represented by counsel, it being understood that questions by counsel at *investigations* shall be presented through the inspectors hearing the case; and no cross-examination by counsel shall be permitted at *investigations*.

INSTRUMENTS, MACHINES, AND EQUIPMENTS APPROVED FOR USE ON VESSELS.

[Year in which approved is given in parentheses.]

LIFEBOATS.

American Balsa Co., Long Island City, N. Y. Nesting type lifeboat, rated as class 1A. (1922.)

Aniello lifeboat. (1895.)

Wm. H. Appleton, New York, N. Y., Gaskin reversible lifeboat. (1918.) Rated as second class 2A, and life raft. (1919.)

Baswitz lifeboat, Gustav H. Schwab, New York, N. Y. (1897.)

P. R. Beaupré, Metropolis, Ill., automatic self-righting and self-bailing lifeboat. (1872.)

Brude lifeboat, Konrad Furubotn, Seattle, Wash. (1913.)

Burke, Wise & Co.'s lifeboat lowering and launching apparatus. (1878.)

Coston 28-foot collapsible lifeboat, approved as a lifeboat of class 2A, and allowed 52 persons; Coston Supply Co., New York, N. Y. (1918.)

Dean & Co.'s improved diagonal lifeboat. (1883.)

Dickinson's self-righting lifeboat. (1881.)

Dobbin's lifeboat. (1885.)

Dobbin's metallic lifeboat. (1888.)

J. Walter Douglas lifeboat. (1893.)

Thomas Drein & Sons, Wilmington, Del., corrugated metallic lifeboat, when fitted with suitable bottom boards of usual form to prevent the bulging of the floor plates by falling timbers. (1900.)

Eddy's patent sea lifeboat. (1883.)

Emergency Fleet Corporation's standard metallic lifeboats 16, 24, and 26 feet in length, and equipments for same. (August, 1918.) Standard metallic lifeboats 20 and 28 feet in length, and standard metallic motor lifeboat 26 feet in length. (October, 1918.)

Engelhardt collapsible lifeboat, The Engelhardt Collapsible Lifeboat Co., Long Island City, N. Y. (1904.)

Konrad Furubotn, Seattle, Wash., Brude lifeboat. (1913.)

Gaskin reversible lifeboat, Wm. H. Appleton, New York, N. Y. (1918.) Rated as second class 2A, and life raft. (1919.)

Hercules patent noncanvas collapsible lifeboat, presented by James Howden & Co. (Ltd.), New York, N. Y. (1918.)

Hills's nesting type of lifeboat, H. B. Hills, of Steward Davit & Equipment Corporation, New York, N. Y. Two 26-foot lifeboats of this type may be nested under a single set of davits. (1919.)

Holmes Motor Co. (Inc.), West Mystic, Conn., S. O. S. lifeboat. (1915.)

James Howden & Co. (Ltd.), New York, N. Y., Hercules patent noncanvas collapsible lifeboat. (1918.)

Hoy semidecked motor lifeboat, M. P. Hoy, Tacoma, Wash. (1916.)

O. R. Ingersoll, self-righting and self-bailing lifeboat. (1887.)

International Automatic Lifeboat Co., Chicago, Ill., and Portland, Me. Metallic lifeboat. (1911.)

George Judson's lifeboat. (1878.)

Lane decked metallic lifeboat, C. M. Lane Lifeboat Co., Brooklyn, N. Y. (1929.)

Lundin decked lifeboat, Welin Davit and Lane & De Groot Co., Long Island City, N. Y. (1912.) See Rule III. (Improvements, subject to approval of supervising inspector of district in which the boat is constructed.) (1915.)

Lundin housed lifeboat, Welin Marine Equipment Co., Long Island City, N. Y. (1914.) See Rule III.

Lundin open lifeboat with balsa-wood fenders, Welin Marine Equipment Co., Long Island City, N. Y. (1914.) See Rule III.

Lundin power lifeboat, Welin Marine Equipment Co., Long Island City, N. Y. (1914.) See Rule III.

Lundin semidecked lifeboat, Welin Marine Equipment Co., Long Island City, N. Y. (1915.) See Rule III.

Lundin lifeboats of semidecked housed type, presented by Welin Marine Equipment Co., Long Island City, N. Y. (1918.)

Charles R. McCotter's lifeboat, Jacksonville, Fla. (1914.) See Rule III.

Mayer Lifeboat Co. (Inc.), Seattle, Wash. Dory lifeboat approved for vessel engaged exclusively in the business of hook-and-line fishing. (1923.)

Mayo Junior lifeboat, Robert D. Mayo, jr., Hopkins Station, Mich. (1904.)

Mayo Rescue lifeboat, R. D. Mayo, Muskegon, Mich. (1901.)

Loring W. Myer's lifeboat, Lubec, Me. (1905.)

A. D. Newcomb, Richmond, Va., inclosed lifeboat. (1917.)

F. L. Norton's lifeboat; boats to be built of yellow metal. (1887.)

W. J. Nunan's lifeboat, Buffalo, N. Y. (1897.)

Richardson's self-righting and self-bailing lifeboat. (1884.)

S. O. S. lifeboat, Holmes Motor Co. (Inc.), West Mystic, Conn. (1915.)

Gustav H. Schwab, New York, N. Y., Baswitz lifeboat. (1897.)

Shear's self-righting and self-bailing boat. (1873.)

Mr. Stoddars's self-righting and self-bailing lifeboat. (1872.)

William H. Taylor's lifeboat, Narragansett Pier, R. I. (1894.)

Welin Davit and Lane & De Groot Co. See Lundin lifeboats.

Welin Marine Equipment Co. See Lundin lifeboats.

LIFEBOAT-DISENGAGING APPARATUS.

American Safety Navigation Co., Canton, Ohio. Lifeboat-releasing hook (1927.)

Harry A. Attfield, Berkeley, Calif., patent boat-releasing hook. (1917.)

Bouchard & Killian, Milwaukee, Wis., boat automatic-releasing device. (1909.)

Broady boat-releasing gear, presented by Welin Marine Equipment Co., Lon Island City, N. Y. (1918.)

Corser's one-man simultaneous releasing lifeboat hook, Pacific Boat & Iron Works Portland, Oreg. (1918.)

Coston boat-releasing gear, Coston Signal Co. (Inc.), New York, N. Y. (1911.)

Coston positive boat-releasing gear, presented by Coston Supply Co., New York N. Y. (1918.)

Coulter lifeboat-releasing hook, C. J. Coulter, Long Beach, Calif. (1919.)

Duinkers boat-releasing device, Royal Dutch West India Mail, New York, N. Y (1909.)

Eckliff Circulator Co., Detroit, Mich., J. H. Hook Model 1 boat-releasing appliance Name changed in 1918 from Jacques boat-releasing appliance, Damase Jacques Detroit, Mich. (1913.) Klippert lifeboat-disengaging apparatus. (1919.)

Forcier lifeboat-releasing device, Joseph Forcier, Seattle, Wash. (1925.)

Gaertner boat-releasing hook, R. A. Gaertner, Seattle, Wash. (1911.)

Galbraith releasing gear, C. C. Galbraith & Sons, New York, N. Y. (1920.)

J. J. Haviside, jr., San Francisco, Calif. Boat-releasing hook. (1911.)

Hills boat-releasing gear, New York Shipbuilding Co., Camden, N. J. (1917 Name changed to Steward boat-releasing gear, manufactured by the Steward Davit Equipment Corporation, Hudson, N. Y. (1918.) Steward lifeboat releasing gear Type AA, manufactured by Steward Davit & Equipment Corporation, Hudson, N. Y (1923.)

Hills releasing gear for open boats with collapsible sides and low freeboard, presented by the Steward Davit & Equipment Corporation, New York, N. Y. (1921.)

William J. Huff, Toronto, Canada. Boat-releasing hook. (1912.)

Charles Hunt, New York, N. Y. Improvement in boat-detaching apparatus (1924, 1926.)

Interisland disengaging boat hook, presented by Capt. A. Tullett, Honolulu Hawaii; approved for use only in Hawaiian waters. (1909.)

Irwin lifeboat-disengaging hook, presented by Irwin Manufacturing Co., San Francisco, Calif. (1914.)

J. H. Hook Model 1 boat-releasing appliance, Eckliff Circulator Co., Detroit, Mich Name changed in 1918 from Jacques boat-releasing appliance, Damase Jacques Detroit, Mich.

Jacques boat-releasing appliance, Damase Jacques, Detroit, Mich. (1913.) Nam changed in 1918 to J. H. Hook Model 1 boat-releasing device, manufactured by Eckliff Circulator Co., Detroit, Mich.

Kinney Bros., Buffalo, N. Y., Young's lifeboat-releasing device. (1909.)

Klippert lifeboat-disengaging apparatus, Eckliff Circulator Co., Detroit, Mich (1919.)

C. M. Lane Lifeboat Co., Brooklyn, N. Y., Porter instantaneous engaging and disengaging device. (1917.)

A. Luckhurst, New York, N. Y., Murray boat-disengaging apparatus. (1909.)

Capt. Allen Luckhurst, International Navigation Co., New York, N. Y., Semple & Ward boat-disengaging apparatus. (1907.)

Owen J. McGowan, president, Raymond Releasing Device (Inc.), New York, N. Y., the Yankee boat-disengaging apparatus. (1919.) Improved Raymond device. (1921.) Improved Yankee device. (1921.)

Manly lifeboat releasing device, Manly Lifeboat Releasing Device Co. (Inc.), Norfolk, Va. (1923.)

John A. McNabb, New York, N. Y., boat-releasing device. (1918.)

Mills patent boat-disengaging gear, presented by William Mills Co. (Ltd.), Sunderland, England. (1906.) New type, presented by American Balsa Co., Long Island City, N. Y. (1922.)

Monarch Valve Co., Brooklyn, N. Y., Windon boat-releasing gear. (1916.)

Murray boat-disengaging apparatus, A. Luckhurst, New York, N. Y. (1909.)

New England Navigation Co.'s standard boat-disengaging gear. (1906.)

New York Shipbuilding Co., Camden, N. J., Randle patent boat-disengaging apparatus. (1907.) Hills boat-releasing gear. (1917.)

Pacific Boat & Iron Works, Portland, Oreg., Corser's one-man simultaneous releasing lifeboat hook. (1918.)

Porter instantaneous engaging and disengaging device, C. M. Lane Lifeboat Co., Brooklyn, N. Y. (1917.)

Randle patent boat-disengaging apparatus, presented by the New York Shipbuilding Co., Camden, N. J. (1907.)

Raymond boat-releasing apparatus, presented by James R. Raymond, New York, N. Y. (1906.) Rule adopted August, 1918: On and after November 1, 1918, all Raymond lifeboat releasing hooks shall be arranged with a continuous fall so as to insure the coincident lowering of the forward and after ends of the boat, the releasing gear to be attached to the boat with fittings appropriate for the Raymond gear. This rule shall apply to Raymond hooks installed after August 12, 1918. Improved Raymond boat-releasing apparatus, presented by Owen J. McGowan, New York, N. Y. (1921.)

Henry E. Rottmer, Washington, D. C., boat-detaching device, approved only when installed with the lever fitted so as to be conveniently operated by the officer of the boat. (1906.)

Royal Dutch West India Mail, New York, N. Y., Duinkers boat-releasing device. (1909.)

Semple & Ward boat-disengaging apparatus, presented by Capt. Allen Luckhurst, International Navigation Co., New York, N. Y. (1907.)

Steward Davit and Equipment Corporation, Hudson, N. Y. Hills boat-releasing gear. (1917.) Hills releasing gear for open boats with collapsible sides and low freeboard. (1921.) Steward boat-releasing gear. (1918.) Steward lifeboat releasing gear, Type AA. (1923.)

Togersen releasing gear for double-bottom lifeboats, presented by B. E. Togersen, Seattle, Wash. (1921.)

Tregoning releasing gear, Tregoning Boat Co., Seattle, Wash. (1920.)

Capt. A. Tullett, Honolulu, Hawaii, Interisland disengaging boat hook, approved for use only in Hawaiian waters. (1909.)

Welin-Maclachlan gravity davit, presented by the Welin Davit & Boat Corporation, Long Island City, N. Y. (1929.)

Welin Marine Equipment Co., Long Island City, N. Y., Broady boat-releasing gear. (1918.)

Charles E. Wicks, Norfolk, Va., Boat-detaching hook. (1909.)

Williams automatic boat-releasing gear, presented by William F. Williams, New York, N. Y. (1928.)

Windon boat-releasing gear, Monarch Valve Co., Brooklyn, N. Y. (1916.)

The Yankee boat-disengaging apparatus, Owen J. McGowan, president, Raymond Releasing Device, (Inc.), New York, N. Y. (1919.) Improvement. (1921.)

Young's lifeboat-releasing device, presented by Kinney Bros., Buffalo, N. Y (1909.)

LIFE RAFTS.

A B C life float (balsa wood), Welin Marine Equipment Co., Long Island City, N. Y. (1917.) See Rule III.

American Flexible Life Raft Co. (1877.)

Ammen metallic balsa or life raft. (1895.)

Anderson & Bailey, San Francisco, Calif. (1910.)

Angelus life raft, William Jacob, San Leandro, Calif. Equivalent to a pontoon life raft of the standard type. (1919.)

Wm. H. Appleton, New York, N. Y., Gaskin reversible life raft. (1918.) Gaskin reversible lifeboat rated as life raft. (1919.)

Beasley's life raft. (1881.)

M. A. Bryson's deer-hair life raft. (1877.)

Hon. H. C. Calkin's (New York) metallic raft. (1872.)

Cambridge life float, presented by The T. J. Flynn Metal Works (Inc.), Cambridge, Mass. (1918.)

Carley life float, Carley Life Float Co., M. T. Whiton, president. (1901.) See Rule III.

Chamber's life raft. (1888.)

Churchman & Groves, Philadelphia, Pa., Columbia life raft. (1886.)

Clark's life raft, care Detroit Shipbuilding Co., Detroit, Mich. (1873, 1910.)

Columbia life raft, Churchman & Groves, Philadelphia, Pa. (1886.)

J. A. Cone. (1875.) Drein & Son, Wilmington, Del. (1886.)

Court life float, types A and B, A. B. Court, naval constructor, U. S. N. (1918.)

Davis's life raft. (1877.)

Detroit Shipbuilding Co., Detroit, Mich., care of Clark life raft. (1873, 1910.)

Emergency Fleet Corporation's standard metallic pontoon life rafts, and equipments for same, for 12, 17, and 24 persons. (August, 1918.)

The T. J. Flynn Metal Works (Inc.), Cambridge, Mass., Cambridge life float. (1918.)

Frazee Lift Raft Co., New York, metallic raft. (1872.)

Gaskin reversible life raft, Wm. H. Appleton, New York, N. Y. (1918.)

Gaskin reversible lifeboat rated as life raft, William H. Appleton, New York, N. Y. (1919.)

Griffith life raft. (1890.)

Emmett Harding's combined life raft and settee, when cylinders are constructed of metal. (1884.)

Herreshoff Manufacturing Co., Bristol, R. I., Sweeney life float. (1918.)

Edwin A. Hay's life raft. (1883.)

Hussey life raft. (1894.)

O. R. Ingersoll, New York, metallic raft. (1872.) Life raft, canvas cylinders covered with rattan, when provided with cross braces and air-tight valves for determining its air-tight condition. (1884.) Life raft composed of two cylinders made of cane and filled with block cork. (1887.)

William Jacob, San Leandro, Calif., Angelus life raft, equivalent to a pontoon life raft of the standard type. (1919.)

David Kahnweiler's metallic life raft, New York, N. Y. (1888.)

Lane & De Groot, Brooklyn, N. Y., metallic life raft. (1898.)

Lane life float (balsa wood), C. M. Lane Lifeboat Co. (Inc.), Brooklyn, N. Y. (1928.) Lane balsa life float, 5-person capacity, for use on boats of the motorboat class where lifeboats or life rafts are not required, and not to be used in lieu of the required life preservers. (1928.)

Le Duc Tule Improvement Co.'s life raft, San Francisco, Calif. (1886.)

McDonah life float, John H. McDonah, Boston, Mass. (1918.)

J. J. McLaughlin's life raft, Bombay, India. (1918.)

Matson life raft, H. J. Matson, Boston, Mass. (1909.)

Miller's life-saving raft. (1881.)

Moran Bros. Co., Seattle, Wash., metallic life raft. (1906.)

Ogden's life raft. (1874.)

W. S. Ray Manufacturing Co., San Francisco, Calif., metallic life raft. (1906.)

L. H. Raymond, the Reliance metallic life raft, New York, N. Y. (1896.)

Lewis H. Raymond's life raft. (1881.)

Reliance metallic life raft, L. H. Raymond, New York, N. Y. (1896.)

Rider's life raft. (1877.)

Robert Roberts's metallic raft. (1884.)

John T. Smith's metallic life raft, when the cylinders are provided with water-tight bulkheads placed not over 2 feet apart. (1884.) Life raft, when constructed of galvanized iron of not less than 24-wire gauge, Birmingham standard, in thickness. (1885.)

Sweeney life float, presented by the Herreshoff Manufacturing Co., Bristol, R. I. (1918.)

Torrey & Co. (1872.)

Twigg life raft, presented by John F. Twigg, San Francisco, Calif. Standard pontoon type of raft. (1919.)

F. H. Ward's metallic folding life raft. (1897.)

Woolsey's life buoy. Rated for two persons, for lake, bay, and river, when made, as at present, of 52 pounds of cork, and in that proportion when containing a greater amount of cork. (1881–1883.)

Welin Davit and Lane & De Groot Co., New York, N. Y. Metallic life raft. (1911.)

Welin Marine Equipment Co., Long Island City, N. Y., A B C life float. (1917.) See Rule III.

LIFE PRESERVERS.

A B C balsa-wood life jacket, with ilanasilk collar, for adult and for child, Edmonds's. (1919.) See Robinson & Roders Co.

A B C life belt (balsa wood), presented by the Lane & De Groot Co., New York, N. Y. (1909.)

A B C life preserver (balsa wood), presented by the Welin Davit and Lane & De Groot Co., Long Island City, N. Y. (1912.)

Armstrong Cork Co., Pittsburgh, Pa., child's cork life preserver. (1916.)

Cork block body with kapok collar. (1919.) Block cork life preserver for adults. (1922.) Eight-block jacket type. (1923.)

Atlantic-Pacific Manufacturing Co., Brooklyn, N. Y., cork block body with kapok collar. Kapok body with kapok collar. (1919.)

Atlantic-Pacific Manufacturing Corporation, Brooklyn, N. Y. No. 3 cork-block life preserver. (1922.)

Miss Anna Deane Bailey, New York, N. Y.; improved life preserver No. 1, of the jacket and collar type, filled with 28 ounces of prime Java kapok; two types of the Bailey adjustable and reversible kapok life preservers for adults and children, one with brass grommets, and one with eyelets for strap leaders. (1918.)

Bailey life preservers. See G. H. Masten Co. (Inc.).

Betsy Ross Flag Co. (Inc.), Newburgh, N. Y. For use on river steamers. (1925.)

Boddy No. 4 life-saving jacket (kapok), presented by Boddy Life-Saving Appliances (1914) (Ltd.), London, England. (1918.)

Justus Brauer & Son Co., Camden, N. J. (1924.)

H. Brunswig, life-saving buoy, Hoboken, N. J. (1898.)

Bryson's deer-hair life preserver. (1877.)

Butz block-cork life preserver, A. L. Butz Cork Co., Philadelphia, Pa. (1905.)

E. Clark, cork life preserver. (1872.)

George Clark, jr., life preserver. (1878.)

Eliza R. Cogswell, life preserver invented by. (1883.)

Compressed Cork Co., Ossining, N. Y., adult cork body with kapok collar. (1920.) Also manufactured by L. Mundet & Son, Brooklyn, N. Y. (1922.) Child's life preserver, cork body and kapok collar. (1921.)

Coston improved life belt (combination cork and kapok), presented by Coston Supply Co., New York, N. Y. (1918.)

Clara V. Czepull, Lancaster, Pa., block-cork life preserver. (1915.)

Dreadnaught life preserver made of prime Java kapok. (1919.) Modified Dreadnaught life preserver made of kapok. (1920.) Safety-At-Sea Corporation, New York, N. Y.

James S. Dunant's California tule life preserver. (1884.)

Edmonds's life preservers. See Robinson & Roders Co.

Everfloat Life Preserver Co., New York, N. Y., Sanitary Java kapok life preserver. (1918.)

Fedco Marine Appliance Corporation, Jersey City, N. J. Kapok life preserver of the jacket type, with collar. (1922.)

Foster life preservers. Type A for ocean and coastwise vessels. Types B and C for lake, bay, sound, and river vessels. Presented by The Foster Manufacturing Co., New Orleans, La. (1921.)

C. C. Galbraith & Son (Inc.), New York, N. Y., cork block body with kapok collar. (1919.) Child's life preserver, cork body and kapok collar. (1920.)

Charles Garrison, Boston, Mass., Kapo Neversink life preserver. (1917.)

Godfrey & Boyce's life preserver. (1875.)

W. K. Greenebaum, Chicago, Ill., block-cork life preserver, adjustable, for adult or child. (1916.)

J. B. Hamilton's life preserver, Springfield, Mass. (1901.)

Haviside, Withers & Davis, San Francisco, Calif., International tule life preserver, one kind for adults and one kind for children. (1917.)

George W. Hendry, San Francisco, Calif., tule life preserver, adjustable, for adult or child. (1916.)

Dr. Charles Hunt's life preserver, New York, N. Y. (1907.)

O. R. Ingersoll, cork life preserver. (1872.)

International tule life preserver, one kind for adults and one kind for children, presented by Haviside, Withers & Davis, San Francisco, Calif. (1917.)

Kahnweiler's never-sink life preserver. (1874.)

D. Kahnweiler & Son's pressed-cork life preserver. (1894.)

David Kahnweiler's Sons, New York, N. Y. Kahnweiler's never-sink cork life jacket with kapok collar. Cork block body with kapok collar. (1919.) Child's life preserver, cork body and kapok collar. (1920.) Eight-pocket type cork-block life preserver. (1922.) Name changed to Kahnweiler Marine Equipment Co. (1924.)

Kapo Manufacturing Co., Boston, Mass., life jacket and commercial life preserver, kapok. (1918.) Kapok body with kapok collar. (1919.)

Kapo Neversink life preserver, Charles Garrison, Boston, Mass. (1917.)

Knickerbocker Supply Co., New York, N. Y., kapok jacket life preserver. (1918.)

Lancaster Cork Works, Lancaster, Pa. (1922.) Eight-block jacket type. (1923.)

Lane & De Groot Co., New York, N. Y., A B C life belt (balsa wood). (1909.)

C. M. Lane, of the Lane & De Groot Co., Long Island City, N. Y., the ravenswood life preserver. (1904.)

Le Duc Tule Improvement Co.'s life preserver. (1886.)

Joseph K. McCammon, the Le Duc. (1887.)

G. H. Masten Co. (Inc.)., New York, N. Y., kapok life-preserver jacket. (1918.) Bailey cork life-preserver jacket with kapok collar, Bailey kapok life-preserver jacket with combination kapok collar and hood, cork block body with kapok collar, kapok body with kapok collar, Masten's cork life preserver, Masten's kapok life preserver. (1919.) Masten's child's life preserver with cork body and kapok collar, and Masten's child's life preserver with kapok body and kapok collar. (1920.)

Morrison Life Belt Co., St. Louis, Mo., cork life preserver. (1904.)

L. Mundet & Son, Brooklyn, N. Y., cork block body with kapok collar, kapok body with kapok collar. (1919.) Also manufactures adult life preserver with cork body and kapok collar approved for Compressed Cork Co., Ossining, N. Y. (1922.)

L. Mundet & Son (Inc.), Brooklyn, N. Y. Eight-block jacket type. (1923.)

National Cork Co., life preserver, Brooklyn, N. Y. (1904.)

Ravenswood life preserver, C. M. Lane, of the Lane & De Groot Co., Long Island City, N. Y. (1904.)

Fitch Reynolds's cork life preserver. (1879.)

Robinson & Roders Co., Newark, N. J., Universal ilanasilk ship life preserver, adjustable for adult or child. (1916; modified, 1918.) Universal ilanasilk pillow life preserver, adjustable, for adult or child. (1916.) Universal ilanasilk patrol life preserver. (June, 1916; modified, 1918.) Universal ilanasilk jacket life preserver. (1917, 1918; modified and approved for adults and children, 1918.) Edmonds's A B C balsa-wood life jacket, with ilanasilk collar, for adult and for child; Edmonds's cork life jacket with ilanasilk collar; Edmonds's life jacket with kapok body and kapok collar for adult, same for child; Edmonds's life jacket with balsa wood body and kapok collar for adults, same for child. (1919.)

Safety-At-Sea Corporation, New York, N. Y. Dreadnaught life preserver made of prime Java kapok. (1919.) Modified dreadnaught life preserver made of kapok. (1920.)

Sanitary Java kapok life-preserver vest, presented by the Everfloat Life Preserver Co., New York, N. Y. (1918.)

M. A. Scott, cork life preserver. (1872.)

J. A. Seamans, cork life preserver. (1872.)

John T. Smith, New York, N. Y. The Edward Maynard life preserver. (1887.) Life preserver. (1892.)

Universal life preservers. *See* Robinson & Roders Co.

United Indurated Fibre Co., Lockport, N. Y. (1908.)

Upson-Walton Co., solid-cork life preservers, Cleveland, Ohio. (1905.)

Welin Davit and Lane & De Groot Co., Long Island City, N. Y., A B C life preserver (balsa wood). (1912.)

White & Hay's cork life jacket. (1878.)

LIFE BUOYS.

A B C ring life buoy (balsa wood), presented by Welin Marine Equipment Co., Long Island City, N. Y. (1916.) See Rule III.

George Bernard Dame, Brooklyn, N. Y., Indestructible ring life buoys (cork), types A and B. (1918.)

Indestructible ring life buoys (cork), types A and B, presented by George Bernard Dame, Brooklyn, N. Y. (1918.)

Robinson-Roders Co., Newark, N. J., Universal ilanasilk ring life buoy. (1917.)

Universal ilanasilk ring life buoy, presented by Robinson-Roders Co.,, Newark, N. J. (1917.)

Welin Davit and Boat Corporation, Long Island City, N. Y., ring life buoy made of balsa wood. (1924.) ·

Welin Marine Equipment Co., Long Island City, N. Y., A B C ring life bouy. (1916.) See Rule III.

LINE-CARRYING GUNS AND PROJECTILES.

American and British Manufacturing Co., Bridgeport, Conn.

Bridger shoulder gun, the Naval Co., Roslyn, Pa. (1924.)

Coston line-carrying gun, Coston Signal Co., New York, N. Y. (1913.)

Coston Signal Co., New York, N. Y., Coston line-carrying gun. (1913.)

Coston Supply Co., New York, N. Y. Shoulder gun. (1919.)

Driggs Ordnance Co. (Inc.), New York, N. Y. Sayres line-carrying gun. (1919.)

C. D. Durkee & Co., New York, N. Y. (1919.)

C. C. Galbraith & Son, New York, N. Y. (1919.)

The General Ordnance Co., Groton, Conn. (1919.)

E. George & Co. (Inc.), New York, N. Y. (1919.)

Hall improved breech-loading life-line gun presented by The Naval Co., Philadelphia, Pa. Models A and B. (1919.) Model F, two types. (1920.)

Hunt's line-carrying gun, large. (1890.)

Hunt's line-carrying gun, small. May be used on all vessels from 100 to 500 tons. (1890.)

Hunt gun, No. 2, 20 inches long, 2½ inches diameter of bore. May be used on steam vessels from 100 to 500 tons when the gun is constructed in all its parts of material same as used in the large Hunt gun already approved by this board. (1893.)

International line-carrying gun No. 3, George Murch, New York, N. Y. (1909.)

David Kahnweiler's Sons, New York, N. Y. (1915.)

Knickerbocker Supply Co., New York, N. Y. (1919.)

Lyle life-saving shoulder gun may be used on all vessels not exceeding 300 gross tons. (1906.)

Lyle line-carrying gun. (1890.)

McNab Co., Bridgeport, Conn. (1919.)

Marine Manufacturing & Supply Co., New York, N. Y. (1919.)

George Murch, New York, N. Y., International line-carrying gun No. 3. (1909.)

Meyer & Rogers, Seattle, Wash., gun and self-anchoring projectile carrying a life line. (1907.)

Meyer-Rogers line-carrying gun No. 2, Meyer-Rogers Projectile Co., New York, N. Y. (1909.)

Meyer-Rogers Projectile Co., New York, N. Y., Meyer-Rogers line-carrying gun No. 2. (1909.) Equipment for Meyer-Rogers line-carrying guns Nos. 1 and 2. (1909.)

The Naval Co., Philadelphia, Pa., Hall improved breech-loading life-line gun. Models A and B. (1919.) Model F, two types. (1920.)

The Naval Co., Roslyn, Pa., Bridger shoulder gun. (1924.)

R. S. Newbold & Sons Co., Norristown, Pa. (1919.)

Wm. Read & Sons (Inc.), Boston, Mass. Shoulder gun. (1919.)

Sayres line-carrying gun, Driggs Ordnance Co. (Inc.), New York, N. Y. (1919.)

Sample line shot tracer, presented by John B. Semple, Pittsburgh, Pa. (1907.)

A. P. Smith Manufacturing Co., East Orange, N. J. (1919.)

Steward Davit & Equipment Corporation, New York, N. Y. Two types. (1919.)

The Tozzi Manufacturing Co., New York, N. Y. (1919.)

United States Life-Saving Equipment Co., Boston, Mass. Illuminated double line-carrying shot. (1911.)

The James Walker Co., Baltimore, Md. (1919.)

LOW-WATER INDICATORS.

Ohio low-water alarm, the Ohio Injector Co., Chicago, Ill. (1928.)

FIRE EXTINGUISHERS.

SODA-ACID.

Effect: Primarily quenching and cooling.
Freezing: Requires protection below 32° F.
Dielectric: Low.

Uses: For wood, paper, and fabric fires.

Limitations: Least effective on flammable liquid fires. Dangerous on fires in electrical apparatus.

By-effects: Acid detrimental to fabrics, etc.

ANTIFREEZE.

Chemicals treated to resist freezing.

Otherwise generally same as soda-acid.

Under this classification are calcium-chloride and "loaded stream" types.

CARBON-TETRACHLORIDE.

Effect: Becomes fire-smothering gas at 140° F.

Freezing: Nonfreezing above minus 50° F.

Dielectric: High. Safe at 5,000 volts.

Uses: For fires in electrical apparatus and in confined fires in flammable liquids where burning surface is accessible to stream.

Limitations: Ineffective unless vaporized by heat, and smothering gas quickly dissipates in atmosphere.

By-effects: Gas strangulating, but not toxic. Harmless to fabrics, etc.

FOAM (OR FROTH).

Effect: Smothering by inert gas in foam blanket.

Freezing: Solutions require protection below 32° F. Dry powders unaffected by atmospheric temperatures.

Dielectric: Low.

Uses: For fires in combustible materials and flammable liquids where burning surface is accessible to stream or flow.

Limitations: Dangerous on fires in electrical apparatus.

By-effects: Harmless.

CARBON-DIOXIDE (DIRECT).

Effect: Smothering and cooling by inert gas applied direct on flame or into burning compartment.

Freezing: Unaffected by atmospheric temperatures.

Dielectric: High. Equal to air.

Uses: For fires in combustible materials, flammable liquids, and electrical apparatus.

Limitations: Except in confined spaces, smothering gas quickly dissipates in atmosphere.

By-effects: Smothering, but not toxic or strangulating.

SULPHUR-DIOXIDE (DIRECT).

Generally same as carbon-dioxide, but

By-effects: Highly strangulating though not toxic, and in contact with water forms injurious sulphuric acid.

SUMMARY.

CLASS OF FIRE.	CLASS OF EXTINGUISHERS.
A. In ordinary combustible material	Quenching and cooling; blanketing; direct smothering.
B. In flammable liquids	Blanketing; direct smothering.
C. In electrical equipment	Nonconducting.

LIQUID CHEMICAL FIRE EXTINGUISHERS APPROVED FOR USE ON VESSELS ON AND AFTER JANUARY 1, 1920.

Aaron, Robinson Fire Apparatus Manufacturing Co., or Stempel Fire Extinguisher Manufacturing Co., St. Louis, Mo.

Accurate, National Metal Stamping Manufacturing Co., Newark, N. J.

Accurate pump tank; formerly Guardene pump tank, which see.

Ajax No. 1, Ajax Fire Engine Works, Brooklyn, N. Y.

Ajax No. 3 (1 quart, carbon tetrachloride), Ajax Fire Engine Works, Brooklyn, N. Y.

Alaskan (calcium chloride solution. Use of Alaskan charges required), The General Manufacturing Co., St. Louis, Mo.

Alenco, W. D. Allen Manufacturing Co., Chicago, Ill.

Alert, American-La France & Foamite Corporation, Elmira, N. Y.[1]

Alfite system (carbon dioxide), American-La France & Foamite Corporation, Elmira, N. Y.

Apex, Minimax Co., New York, N. Y.

Arrow, M. L. Snyder & Son, Philadelphia, Pa.

Atlas, Northern Fire Apparatus Co., Minneapolis, Minn.

Automatic, Geo. W. Diener Manufacturing Co., Chicago, Ill.

Badger's, Badger Fire Extinguisher Co., Boston, Mass.

Badger's No. 1 (1 quart, carbon tetrachloride), Badger Fire Extinguisher Co., Boston, Mass.

Badger's Pony, Badger Fire Extinguisher Co., Boston, Mass.

Bear, American-La France & Foamite Corporation, Elmira, N. Y.[1]

Bear (1 and 1½ quarts, carbon tetrachloride), The American Rubber Manufacturing Co., San Francisco and Los Angeles, Calif.

Boyce Fire Syphon, Model B (1 and 1½ quarts, carbon tetrachloride), Boyce & Veeder Co. (Inc.); factory, Dayton, Ohio; general office, Long Island City, N. Y.

Buffalo (2½ gallons), Buffalo Fire Appliance Corporation, Buffalo, N. Y.

Buffalo (2½ gallons, foam type), Buffalo Fire Appliance Corporation, Buffalo, N. Y.

Buffalo No. 2 (1 quart, carbon tetrachloride), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

Buffalo No. 3 (1 quart, carbon tetrachloride), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

Buffalo No. 4 (1½ quarts, carbon tetrachloride), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

Buscoba, American-La France & Foamite Corporation, Elmira, N. Y.[1]

Cascade, Seattle Hardware Co., Seattle, Wash.

Castle Fire Guard, James M. Castle (Inc.), Philadelphia, Pa.

Castle Fyr Guard, James M. Castle (Inc.), Philadelphia, Pa.

Chief Croker (2½ gallons), Croker National Fire Prevention Engineering Co., New York, N. Y.

Chief Croker (1 quart, carbon tetrachloride), Croker National Fire Prevention Engineering Co., New York, N. Y.

Childs, American-La France & Foamite Corporation, Elmira, N. Y.[2 3]

Childs's Model A (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[2]

Childs's Model B (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[2]

Columbia, Columbia Fire Extinguisher Co., New York, N. Y.

Crescent, John Simmons Co., New York, N. Y.

CT (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[4]

Dayton (1 quart and 1½ quarts, carbon tetrachloride), The Fyr-Fyter Co., Dayton, Ohio.

Defender (2½ gallons), Schwartz Bros., Philadelphia, Pa.

Defender (1 quart and 1½ quarts, carbon tetrachloride), Schwartz Bros., Philadelphia, Pa.

Deluge, Fabric Fire Hose Co., New York, N. Y.

Eastman, Western Inspection Co., Buffalo, N. Y.

Ecnarusni, Buffalo Chemical Fire Extinguisher Co., Buffalo N. Y.

Edwards, H. D. Edwards & Co., Detroit, Mich.

Elkhart, Elkhart Brass Manufacturing Co., Elkhart, Ind.

F. F., Fyr-Fyter Co., Dayton, Ohio.

Fairbanks, The Fairbanks Co., New York, N. Y.

Fairmorse, The Canadian Fairbanks-Morse Co. (Ltd.), Montreal, Canada.

Fire Gun No. 0 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[3 5]

Fire Gun No. 1 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[3 5]

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[1] Formerly American-La France Fire Engine Co.

[2] Formerly O. J. Childs Co.

[3] Formerly Foamite Childs Corporation.

[4] Formerly Foamite Firefoam Co.

[5] Formerly Fire Gun Manufacturing Co. (Inc.).

Fire Gun No. 2 (1½ quarts, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[3] [5]

Fire Gun, Type B, American-La France & Foamite Corporation, Elmira, N. Y.[5]

Firefly (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[4]

First Aid (2½ gallons), W. D. Allen Manufacturing Co., Chicago, Ill.

Foam Fyr-Fyter (2½ gallons, foam type), Fyr-Fyter Co., Dayton, Ohio.

Foamite fire-extinguishing systems may be of a type employing either two-solution tanks or a generator using an approved dry chemical mixture; American-La France & Foamite Corporation, Elmira, N. Y.

Foamite, Type CA (2½ gallons, foam type) American-La France & Foamite Corporation, Elmira, N. Y.[3]

Foamite Type U. S. No. 2½ (2½ gallons, foam type) American-La France & Foamite Corporation, Elmira, N. Y.[3, 4]

Foamite Type U. S. No. 5 (4 gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[3, 4]

Fofire (1 quart and 1½ quarts, carbon tetrachloride), American Fomon Co., Philadelphia, Pa.

Fyre-Freez, Type A (carbon dioxide), Fyre-Freez Corporation, New York, N. Y.

Fyr-Fyter, Super Model (1 and 1½ quarts, carbon tetrachloride), The Fyr Fyter Co., Dayton, Ohio.

Fyr-Fyter (2½ gallons, pump tank), the Fyr-Fyter Co., Dayton, Ohio.

Gold Seal, Goodyear Rubber Co., San Francisco, Calif, and Portland, Oreg.

Grinnell, Grinnell Co. (Inc.), Providence, R. I., and Grinnell Co. of the Pacific, San Francisco, Calif.

Guardene, Pyrene Manufacturing Co., New York, N. Y.

Guardene pump tank, 5 gallons' capacity, accepted in lieu of the 2½-gallon fire extinguisher, Pyrene Manufacturing Co., New York, N. Y. Name changed to Accurate pump tank.

Hale, American-La France & Foamite Corporation, Elmira, N. Y.[1], and George C. Hale, Kansas City, Mo.

Hayward, American-La France & Foamite Corporation, Elmira, N. Y.[6]

Hickory, Kelley-How-Thomson Co., Duluth, Minn.

J-M (1 quart, carbon tetrachloride), H. W. Johns-Manville Co., New York, N Y.

Jennison, The Jennison Hardware Co., Bay City, Mich.

Josico, John Simmons Co., New York, N. Y.

Kar-bo-lene (2 quarts, carbon tetrachloride), Knight & Thomas (Inc.), Boston Mass.

Keystone, James Boyd & Bro. (Inc.), and National Fire Protection Co., Philadelphia, Pa.

Kilflame, Superior Products Co., Dallas, Tex.

La France (two makes of 1 quart and one of 1½ quarts, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France Foam Type (2½ gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 3 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 4 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 5 (1½ quarts, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 6 (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.

La Prudencia, American-La France & Foamite Corporation, Elmira, N. Y.[6]

Louisville, American-La France & Foamite Corporation, Elmira, N. Y.[1]; H. W. Neill Co. and Neill-La Vielle Supply Co., Louisville, Ky.

Lux Junior (7½-pound portable, carbon dioxide), Walter Kidde & Co. (Inc.), New York, N. Y.

Lux Standard (15-pound portable, carbon dioxide), Walter Kidde & Co. (Inc.), New York, N. Y.

Magician, Washington Rubber Co., Washington, D. C.

Marswell, Marshall-Wells Co., Duluth, Minn.

Marvel, Howard-Cooper Corporation, Portland, Oreg.; Seattle, Spokane, Boise.

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[1] Formerly American-La France Fire Engine Co.

[3] Formerly Foamite Childs Corporation.

[4] Formerly Foamite Firefoam Co.

[5] Formerly Fire Gun Manufacturing Co. (Inc.).

[6] Formerly S. F. Hayward & Co.

McGowin-Lyons, McGowin-Lyons Hardware & Supply Co., Mobile, Ala.

McGowin-Lyons (2½ gallons), identification mark "EX–945," Phister Manufacturing Co., Cincinnati, Ohio.

Memphi, Riechman-Crosby Co., Memphis, Tenn.

Metropolitan, Metropolitan Fire Extinguisher Co., New York, N. Y.

Metropolitan No. 2, Metropolitan Fire Extinguisher Co., New York, N. Y.

Miller Peerless (1 and 1½ quarts, carbon tetrachloride), Miller Peerless Mfg. Co., Chicago, Ill.

Type S Copper Minimax, 1½ and 2½ gallons, Minimax Co., New York, N. Y.

National (1 quart, carbon tetrachloride), National Foam System (Inc.), Philadelphia, Pa.

National (2½ gallons), National Foam System (Inc.), Philadelphia, Pa.

Niagara (1 and 1½ quarts, carbon tetrachloride), The Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

Non-Slop Guardene, Pyrene Manufacturing Co., New York, N. Y.

One Quart (1 quart, carbon tetrachloride), American-La France & Foamite Corporation, Elmira, N. Y.[1]

Pacific, Pacific Mill & Mine Supply Co., San Francisco and Los Angeles, Calif.

Paragon, James Boyd & Bro. (Inc.), and National Fire Protection Co., Philadelphia, Pa.

Patrol, American-La France & Foamite Corporation, Elmira, N. Y.[1]

Peerless, American-La France & Foamite Corporation, Elmira, N. Y.[1]; and Geo. B. Carpenter & Co., Chicago, Ill.

Phister (1 gallon, carbon tetrachloride), The Phister Manufacturing Co., Cincinnati, Ohio. Rated for 2 extinguishers where 4 or more are required in table in Rule IV, for fire extinguishers required for automobiles and motor vehicles carried.

Phister Foam (2½ gallons, foam type), The Phister Manufacturing Co., Cincinnati, Ohio.

Phister S. & A. (2½ gallons), The Phister Manufacturing Co., Cincinnati, Ohio.

Phomene (2½ gallons, foam type), Pyrene Manufacturing Co., Newark, N. J.

Presto (1 quart, carbon tetrachloride), Knight & Thomas (Inc.), Boston, Mass.

Preventor, Prevention Service, New York, N. Y.

Protector No. 10 (40 gallons' capacity), Knight & Thomas, Boston, Mass.

Protex Anti-Freezing, Knight & Thomas, Inc., Boston, Mass.

Pyrene (1 and 1½ quarts carbon tetrachloride), Pyrene Manufacturing Co., New York, N. Y.

Quality, Barber & Ross, Washington, D. C.

Queen, Harker Manufacturing Co., Cincinnati, Ohio.

Queen No. 2 (1 quart, carbon tetrachloride), Harker Manufacturing Co., Cincinnati, Ohio

Quick Service, Vapo Foam Manufacturing Co., Chicago, Ill.

Railway and Marine, Knight & Thomas (Inc.), Boston, Mass.

Red Chief, Akers & Co., Memphis, Tenn.

Red Top, The General Manufacturing Co., St. Louis, Mo.

Red Top (2½ gallons), identification mark "EX–945," Phister Manufacturing Co., Cincinnati, Ohio.

Reliable, Thomas J. Sheehan Co., St. Louis, Mo.

Reliance, W. S. Nott Co., Minneapolis, Minn.

Rescue, American-La France & Foamite Corporation, Elmira, N. Y.[6]

Rough Rider, American-La France & Foamite Corporation, Elmira, N. Y.[1]

Safety, The Safety Fire Extinguisher Co., New York, N. Y.

Salvage, American-La France & Foamite Corporation, Elmira, N. Y.[1]

Security (1½ gallons), A. C. Rowe & Son, New York, N. Y.

Security (1 quart, carbon tetrachloride), A. C. Rowe & Son, New York, N. Y.

Security No. B, A. C. Rowe & Son, New York, N. Y.

Sentry, The Seagrave Co., Columbus, Ohio.

S. F. & T. (2½ gallons), Somers, Fitler & Todd Co., Pittsburgh, Pa.

Shasta (2½ gallons), Buffalo Fire Appliance Corporation, Buffalo, N. Y.

Sieben chemical nozzle, Sieben Chemical Co., Kansas City, Mo.

SodAcid Fyr-Fyter (2½ gallons), The Fyr-Fyter Co., Dayton, Ohio.

Standard, Miller-Peerless Manufacturing Co., Chicago, Ill.

The Stempel (1 and 1½ quarts, carbon tetrachloride), The Stempel Fire Extinguisher Mfg. Co., St. Louis, Mo.

Success, H. W. Johns-Manville Co., New York, Milwaukee.

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[1] Formerly American-La France Fire Engine Co.

[6] Formerly S. F. Hayward Co.

Turner, American-La France & Foamite Corporation, Elmira, N. Y.[1]

Underwriters New No. A1, Knight & Thomas (Inc.), Boston, Mass.

Underwriters (1¼ gallons), Knight & Thomas (Inc),. Boston, Mass.

Underwriters, Type A, Knight & Thomas (Inc.), Boston, Mass.

Underwriters, Type B1, Knight & Thomas (Inc.), Boston, Mass.

Underwriters, New Type, Knight & Thomas (Inc.), Boston, Mass.

Underwriters, Nonslop Type, Knight & Thomas (Inc.), Boston, Mass.

Universal, American Fire Equipment Co., Boston, Mass.

Vulcan, Knight & Thomas (Inc.), Boston, Mass.

Weldon Fireout (1 quart, carbon tetrachloride), Weldon Manufacturing Co., Grand Rapids, Mich.

Woodhouse, The Woodhouse Mfg. Co., New York, N. Y.

Woodwico, Woodward, Wight & Co. (Ltd.), New Orleans, La.

APPROVED CARBON DIOXIDE, FOAM-TYPE, AND CARBON TETRACHLORIDE FIRE EXTINGUISHERS WHICH HAVE DEMONSTRATED A CAPACITY FOR EXTINGUISHING BURNING OILS, BURNING GASOLINE, AND OTHER BURNING PRODUCTS OF PETROLEUM, REQUIRED TO BE CARRIED ON VESSELS CARRYING PASSENGERS WHICH TRANSPORT AUTOMOBILES OR MOTOR VEHICLES THE MOTIVE POWER OF WHICH IS GENERATED BY ANY OF THE PRODUCTS OF PETROLEUM, OR OTHER INFLAMMABLE LIQUIDS, UNDER THE PROVISIONS OF RULE IV RELATING TO FIRE EXTINGUISHERS.

Ajax No. 3 (1 quart), Ajax Fire Engine Works, Brooklyn, N. Y.

Alfite system (carbon-dioxide), American-La France & Foamite Corporation, Elmira, N. Y.

Badger's No. 1 (1 quart), Badger Fire Extinguisher Co., Boston, Mass.

Bear (1 and 1½ quarts), The American Rubber Manufacturing Co., San Francisco and Los Angeles, Calif.

Boyce Fire Syphon, Model B (1 and 1½ quarts), Boyce & Veeder Co. (Inc.), factory, Dayton, Ohio; general office, Long Island City, N. Y.

Buffalo (2½ gallons), Buffalo Appliance Corporation, Buffalo, N. Y.

Buffalo No. 2 (1 quart), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

Buffalo No. 3 (1 quart), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

Buffalo No. 4 (1½ quarts), Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

Chief Croker (1 quart), Croker National Fire Prevention Engineering Co., New York, N. Y.

Childs's Model A (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[2]

Childs's Model B (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[2]

CT (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[4]

Dayton (1 quart and 1½ quarts), The Fyr-Fyter Co., Dayton, Ohio.

Defender (1 quart and 1½ quarts), Schwartz Bros., Philadelphia, Pa.

Fire Gun No. 0 (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[3,5]

Fire Gun No. 1 (1 quart), American-La France & Foamite Corporation Elmira, N. Y.[3,5]

Fire Gun No. 2 (1½ quarts), American-La France & Foamite Corporation, Elmira, N. Y.[3,5]

Firefly (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[4]

Foam Fyr-Fyter (2½ gallons), Fyr-Fyter Co., Dayton, Ohio.

Foamite foam generator using an approved dry chemical mixture, portable type, with not over 150 feet of 2½-inch discharge hose and 1¾-inch nozzle; American-La France & Foamite Corporation, Elmira, N. Y.

Foamite, Type CA (2½ gallons, foam type) American-La France & Foamite Corporation, Elmira, N. Y.[3]

Foamite Type U. S. No. 2½ (2½ gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[3,4]

Foamite Type U. S. No. 5 (4 gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[3,4]

Fofire (1 quart and 1½ quarts), American Fomon Co., Philadelphia, Pa.

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[1] Formerly American-La France Fire Engine Co.

[2] Formerly O. J. Childs Co.

[3] Formerly Foamite Childs Corporation.

[4] Formerly Foamite Firefoam Co.

[5] Formerly Fire Gun Manufacturing Co. (Inc.).

Fomon continuous foam generator using an approved dry chemical mixture, portable type, with not over 150 feet of 2½-inch discharge hose and 1¾-inch nozzle; American Fomon Co. (Inc.), Philadelphia, Pa.

Fyre-Freez, Type A (carbon dioxide), Fyre-Freez Corporation, New York, N. Y.

Fyr-Fyter, Super Model (1 and 1½ quarts), The Fyr-Fyter Co., Dayton, Ohio.

J-M (1 quart), H. W. Johns-Manville Co., New York, N. Y.

Kar-bo-lene (2 quarts), Knight & Thomas (Inc.), Boston, Mass.

La France (two makes of 1 quart and one of 1½ quarts), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France Foam Type (2½ gallons, foam type), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 3 (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 4 (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 5 (1½ quarts), American-La France & Foamite Corporation, Elmira, N. Y.[1]

La France No. 6 (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.

Lux Junior (7½-pound portable), Walter Kidde & Co. (Inc.), New York, N. Y.

Lux Standard (15-pound portable), Walter Kidde & Co. (Inc.), New York, N. Y.

Miller Peerless (1 and 1½ quarts), Miller Peerless Manufacturing Co., Chicago, Ill.

National (1 quart), National Foam System (Inc.), Philadelphia, Pa.

Niagara (1 and 1½ quarts), The Buffalo Chemical Fire Extinguisher Co., Buffalo, N. Y.

One Quart (1 quart), American-La France & Foamite Corporation, Elmira, N. Y.[1]

Phister (1 gallon), The Phister Manufacturing Co., Cincinnati, Ohio. Rated for 2 extinguishers where 4 or more are required in table in Rule IV, for fire extinguishers required for automobiles and motor vehicles carried.

Phister Foam (2½ gallons), The Phister Manufacturing Co., Cincinnati, Ohio.

Phomene (2½ gallons, foam type), Pyrene Manufacturing Co., Newark, N. J.

Presto (1 quart), Knight & Thomas (Inc.), Boston, Mass.

Pyrene (1 and 1½ quarts), Pyrene Manufacturing Co., New York, N. Y.

Queen No. 2 (1 quart), Harker Manufacturing Co., Cincinnati, Ohio.

Security (1 quart), A. C. Rowe & Son, New York, N. Y.

The Stempel (1 and 1½ quarts), The Stempel Fire Extinguisher Mfg. Co., St. Louis, Mo.

Weldon Fireout (1 quart), Weldon Manufacturing Co., Grand Rapids, Mich.

The fire extinguishers referred to of the carbon-tetrachloride type shall not be less than 1 quart capacity, of the foam type not less than 2½ gallons capacity, of the carbon-dioxide type not less than 15 pounds capacity, and no fire extinguisher of over 50 pounds gross weight shall be considered portable unless fitted so that it can be readily moved from place to place.

TANKS.

No. 1 American fire-bucket tank, 15 by 27½ inches (inside measurements), when containing 21 gallons of nonfreezing chemical liquid, and fitted with six 10-quart buckets, shall be allowed in lieu of 8 fire buckets. A. C. Rowe & Son, New York, N.Y.

No. 2 American fire-bucket tank, 18 by 28½ inches (inside measurements), when containing 31 gallons of nonfreezing chemical liquid, and fitted with six 14-quart buckets, shall be allowed in lieu of 11 buckets or 1 barrel and 1 fire bucket. A. C. Rowe & Son, New York, N. Y.

New size No. 2 American fire-bucket tank, 18 by 30½ inches (inside measurements), when containing 33 gallons of nonfreezing chemical liquid, and fitted with seven 13½-quart buckets, shall be allowed in lieu of 12 buckets or 1 barrel and 2 fire buckets. A. C. Rowe & Son, New York, N. Y.

No. 1 Emergency bucket tank, 15 by 31½ inches (inside measurements), when containing 25 gallons of nonfreezing chemical liquid, and fitted with six 10-quart buckets, shall be allowed in lieu of 8 fire buckets. National Enameling & Stamping Co. (Inc.), New York, N. Y.

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[1] Formerly American-La France Fire Engine Co.

No. 2 Emergency bucket tank, $19\frac{3}{4}$ by $33\frac{3}{4}$ inches (inside measurements), when containing 40 gallons of nonfreezing chemical liquid and fitted with six 14-quart buckets, shall be allowed in lieu of 14 buckets or 1 barrel and 4 buckets. National Enamel & Stamping Co. (Inc.), New York, N. Y.

Little Giant portable hand-pump tank, allowed in lieu of the $2\frac{1}{2}$-gallon fire extinguisher when having a capacity of 5 gallons. Little Giant Manufacturing Co., New York, N. Y.

No. 1 Safety fire-bucket tank, 15 by 28 inches (inside measurements), when containing 21 gallons of nonfreezing chemical liquid, and fitted with six 10-quart buckets, shall be allowed in lieu of 8 fire buckets. The Safety Fire Extinguisher Co., New York, N. Y.

No. 2 Safety fire-bucket tank, 18 by 30 inches (inside measurements), when containing 33 gallons of nonfreezing chemical liquid, and fitted with six 14-quart buckets, shall be allowed in lieu of 12 buckets or 1 barrel and 2 fire buckets. The Safety Fire Extinguisher Co., New York, N. Y.

No. 3 Safety fire-bucket tank, 18 by 35 inches (inside measurements), when containing 38 gallons of nonfreezing chemical liquid, and fitted with six 14-quart buckets, shall be allowed in lieu of 14 buckets or 1 barrel and 4 fire buckets. The Safety Fire Extinguisher Co., New York, N. Y.

BUCKETS.

Foamite fire pail, 3 gallons' capacity, foam type, rated as a regular fire bucket; American-La France & Foamite Corporation, Elmira, N. Y.[3] [4]

McLaughlin chemical fire pail, hermetically sealed, 3 gallons' capacity, rated as a regular fire bucket; Daniel B. McLaughlin, Philadelphia, Pa.

Waggoner Sanatory fire bucket, presented by the Geo. W. Diener Manufacturing Co., Chicago, Ill. This bucket has a capacity of 3.3 gallons, is provided with a cover, and contains a water solution of calcium chloride. It is rated as one regular fire bucket.

APPARATUS FOR EXTINGUISHMENT OF FIRE IN COMPARTMENTS OF STEAMERS.

Amdyco fire foam system. Bethlehem Shipbuilding Corporation (Ltd.), Bethlehem, Pa.

Clayton fire-extinguishing system. Clayton Fire Extinguishing Co., New York, N. Y.

Foamite fire-extinguishing systems may be of a type employing either 2-solution tanks or a generator using an approved dry chemical mixture. American-La France & Foamite Corporation, Elmira, N. Y.[3] [4] (See Rule IV.)

Fomon continuous foam generator using an approved dry chemical mixture, portable type, with not over 150 feet of $2\frac{1}{2}$-inch discharge hose and $1\frac{3}{4}$-inch nozzle. American Fomon Co. (Inc.), Philadelphia, Pa.

Grimm fire-extinguishing system. The Sulphur Dioxide Co., New York, N. Y.

Harker fire-extinguishing system. The Harker Fire Extinguisher & Fumigator Co. (Ltd.), Sydney, New South Wales.

Lux system. Walter Kidde & Co. (Inc.), New York, N. Y. Cylinders containing the carbon dioxide should be weighed at least once each year.

Phomene Accumulator, models 2801 and 401. Pyrene Manufacturing Co., Newark, N. J.

STEAM PUMPS.

Coll's single-suction steam siphon, presented by Mr. Coll, Pittsburgh, Pa. (1872).

Coll's improved steam siphon pump. (1874).

Hall's duplex steam pump. (1889.)

Landsell's double-suction steam siphon, presented by H. S. Landsell, New York. (1872.)

A. Slouthouer, New Philadelphia, Ohio, fire and bilge pump. (1872).

Sheriff's steam siphon pump. (1875.)

Van Duzen & Tift's steam jet pump, for use as a steam fire pump on steamers of 100 tons and under. (1884.)

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[3] Formerly Foamite Childs Corporation.

[4] Formerly Foamite Firefoam Co.

SAFETY VALVES.

Ashton safety valve. (1872.) H. G. Ashton, East Cambridge, Mass. Styles C. I. and C. S. (1925.) Styles D. I.; D. I. 10; D. I. 11; and D. I. 12. (1928.) Ashton Valve Co., New York, N. Y.

Coale side outlet safety valve. (1917.) Coale Muffler & Safety Valve Co., Baltimore, Md.

American spring safety valve. (1885.) Ashcroft's safety valve. (1877.) Forms D. I. and D. S. (1924.) Form H, type FH, portable top outlet safety valve. (1927.) Form E, type RB, bronze body; Form E, type RB, cast-iron body; and Form I, type NE, exposed spring bronze body, safety valves. (1929.) Consolidated Ashcroft Hancock Co. (Inc.), Bridgeport, Conn.[1]

Crane pop safety valve. (1895; improvement, 1915.) Nos. 1117, 1117½, 1119, and 1119½. (1928). Crane Co., Chicago, Ill.

Crosby & Meady pop safety valve. (1888.) High efficiency pop safety valve. (1917.) Types HR, HN, and HO. (1928.) Crosby Steam Gage & Valve Co., Boston, Mass.

Lynde safety valve. (1910.) Models D, WT (known in marine use as WTD), C, and F safety valves. (1929.) J. E. Lonergan Co., Philadelphia, Pa.

F. Lunkenheimer safety valve. (1888.) Improved pop safety valve. (1896.) Brass pop safety valves, sizes ⅜ to 2″, and iron body safety valves, sizes 2 to 4½″. (1929.) Lunkenheimer Co., Cincinnati, Ohio.

Spring safety valve. (1892, 1919.) Safety valves, catalogue Nos. 147, 238, and 330. (1929.) Scott Safety Valve Manufacturing Co., Detroit, Mich.[2]

Pop safety valve. (1898.) Nos. 18 and 19, size 4″ style lever, twin safety valves, and Nos. 17, size 3½″, and 15, size 3″, pop safety valves. No. 50, 2″ safety valve. (1929.) Star Brass Manufacturing Co., Boston, Mass.

WATER LIGHTS.

Coston Res-Q-Lite for ring buoys, presented by the Coston Supply Co., New York, N. Y. (1916, 1920.)

Coston Standard Water Lights for rafts, presented by the Coston Signal Co., New York, N. Y. (1916.)

Coston Supply Co. (Inc.), New York, N. Y. Res-Q-Lite, copper water light. (1924.)

C. C. Galbraith & Son, New York, N. Y. (1918, 1926.)

G. R. Holmes, Baltimore, Md. (1920.)

Hook seam, emergency, self-lighting, life-buoy light, presented by Henry J. Pain, New York, N. Y. (Nov., 1916.)

David Kahnweiler's Sons, New York, N. Y., Rescue signal water light. (1916.)

Henry J. Pain, New York, N. Y., Hook seam, emergency, self-lighting, life-buoy light. (Nov., 1916.)

Rescue signal water light, presented by David Kahnweiler's Sons, New York, N. Y. (1916.)

Save-U-Lites, presented by the Automatic Lite Co., Baltimore, Md. (1927.)

PIPE BOILERS.

[Boilers and steam generators not constructed of riveted iron or steel plates, approved under sec. 4429, R. S.]

Acme boiler, Detroit Water Tube Boiler Co., Detroit, Mich. (1902.)

F. S. Allen, New York, N. Y. (1884.)

Almy Water Tube Boiler Co., Providence, R. I. (Types A, B, and C, 1890; types D and E, 1897; Z type, 1911; Type A modified, 1925.)

F. D. Althouse, New York, N. Y. (1889.)

American Fire Engine Co., Cincinnati, Ohio. (1900.)

J. L. Anderson, Seattle, Wash. (1904.)

George W. Arrowsmith, Fort Niagara, N. Y. (1894.)

Aultman & Taylor Machinery Co., Mansfield, Ohio, Park water-tube boiler. (1905.)

Authentic water-tube boiler, Bugbee & Laycock, Chicago, Ill. (1901.)

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[1] Formerly Ashcroft Manufacturing Co., American Steam Gauge & Valve Manufacturing Co., Consolidated Safety Valve Co., and American Schaeffer & Budenberg Corporation.

[2] Formerly Roe Stephens Manufacturing Co.

Babcock & Wilcox, New York, N. Y. (1894; improved type, 1911; drum type, 1911; drum type, 1912; express type, 1914.)

The Babcock & Wilcox Co., New York, N. Y., White-Forster steam generator. (1909.)

The Babcock & Wilcox Co., New York, N. Y. (Modified drum construction, 1928.)

Badenhausen Co., Philadelphia, Pa., improvements in Badenhausen boiler. (1918.)

John P. Badenhausen, Seattle, Wash. (1911; improvements, 1918.)

Augustus Bailey, Spuyten Duyvil, N. Y. (1893.)

E. W. Bailey, Portsmouth, Va. (1907.)

Baker Motors (Inc.), Erie, Pa. (1925.)

Fred A. Ballin, Portland, Oreg. (1906; types Nos. 2 and 3, 1909; improved boiler, 1914.)

Ballin Water Tube Boiler Co., Portland, Oreg., new design of Ballin water-tube boiler. (1917.)

Barnes pipe boiler, presented by Pierre Barnes, Seattle, Wash. (1909.)

Barr & Creelman, Rochester, N. Y. (1900.)

Barr, Reynolds & Co., Rochester, N. Y., E. P. Clapp boiler No. 1. (1897.)

John E. F. Bartlett, Brooklyn, N. Y. (1891.)

Barton Boiler Co., Chicago, Ill., Barton's flash boiler. (1904.)

Bath Iron Works (Ltd.), Bath, Me., Normand boiler. (1914.)

A. J. Beach, Moline, Ill. (1898.)

James Beggs & Co., New York, N. Y., modification of Worthington boiler. (1918.)

The Belleville boiler, presented by Miers Coryell, of New York. (1887.)

C. R. Benton, Vergennes, Vt. (1896.)

B. F. Binnix, Washington, D. C. (1906.)

A. Perry Blivin, Brooklyn, N. Y. (1885.)

W. J. Boland, Chicago, Ill. (1900.)

George Bolland, Pittsburgh, Pa. (1897.)

John Bonner, Tiburon, Calif. (1895.)

Bonson boiler, Lyons Co., De Pere, Wis. (1905.)

Braggin's boiler. See Rochester Machine Tool Works.

Edward Bounds, Pittsburgh, Pa. (1898.)

Bowdish, Skaneateles, N. Y. (1890.)

George D. Bower, Trenton, N. J. (1893.)

Alfred Box & Co., Philadelphia, Pa. (1892.)

L. Boyer's Sons, New York, N. Y. (1894, 1901.)

Ira Bradley, Malden, Mass. (1892.)

Braggin's, Rochester Machine Tool Works, Rochester, N. Y. (1889, 1894.)

Joseph G. Brassard, Central Falls, R. I. (1898.)

George B. Brayton, Providence, R. I. (1885.)

Bretherton boiler, James C. Wignall, Philadelphia, Pa. (1897.)

Brigham & Markham, Hartford, Conn. (1889.)

James H. Brown, Boston, Mass. (1898.)

Buckley Patent water-tube pipe boiler, Rochester Machine Tool Works, Rochester, N. Y. (1896.)

Bugbee & Laycock, Chicago, Ill. Authenic water-tube boiler. (1901.)

Burton semisectional water-tube boiler, De Pere-Burton Co., West De Pere, Wis. (1920.)

Buschmann & Layman, Baltimore, Md. (1895, 1897.)

Buxton-Wilson, Inc., Norfolk, Va., porcupine boiler. (1921.)

James Carnegie, New York, N. Y., Type B. (1899.)

Carnegie Steel Co., Pittsburgh, Pa. (1920.)

Cary's steam generator, changed from Gray's, Providence, R. I. (1891.)

Charles D. Casad, Seattle, Wash. (1902.)

The Casey-Hedges Co., Chattanooga, Tenn. (C-H water-tube boiler, 1917; vertical baffle type C-H water-tube boiler, 1918).

J. Castleman, Brooklyn, N. Y., T. F. Morrin's pipe boiler. (1898.)

C. H. Caswell, Newport, R. I. (1887.)

E. P. Chancellor, Parkersburg, W. Va. (1898.)

Ed. Cheetham, Detroit, Mich. (1900.)

Christiansen marine boiler, John A. Duggan, Boston, Mass. (1894.)

Clapp & Jones Manufacturing Co., Hudson, N. Y. (1889.)

E. P. Clapp boiler No. 1, Barr, Reynolds & Co., Rochester, N. Y. (1897.)

Baylies C. Clark, New York, N. Y. (1896.)

C. B. Clark, South Brewer, Me. (1902.)

E. P. Clark, New York, N. Y. (1894.)

Edward S. Clark, Boston, Mass. (1891, 1895, 1898.)

Louis S. Clark, Pittsburgh, Pa. (1893.)

W. T. Clark, Boston, Mass. (1897.)

Clay & Torbensen, Camden, N. J. (1892.)

Fred Cline, Hoquiam, Wash. (1911.)

Clonbrock Steam Boiler Co., Brooklyn, N. Y. (1891.) The Morrin Climax steam generator, improved boiler. (1902.)

E. J. Codd, Baltimore, Md., Smith patent boiler. (1904.)

Cole & Reinhart, Camden, N. J. (1892.)

Coller Yacht & Engine Works, Detroit, Mich., Coller sectional boiler. (1893, 1895.)

J. M. Colman, Everett, Wash. (1916.)

Colven water-tube boiler, New York Engineering Co., New York, N. Y. (1918.) Type, 1919. Name changed to Ludlum water-tube boiler. (1920.)

Peter Cone, Jacksonville, Fla. (1899.)

D. Connelly Boiler Co., Cleveland, Ohio, Connelly standard water-tube boiler of the drum and bent-tube type, and the Connelly water-tube boiler of the header and straight-tube type. (1917.)

B. F. Cook, Fort Pierce, Fla. (1902.)

Will F. Cook, Oshkosh, Wis. (1906.)

Copeland boiler, when composed in all its parts of wrought iron, copper, brass, or steel, Northrop Manufacturing Co. (1888.)

E. J. Copeland, New York, N. Y. (1891.)

A. E. Corey, Allegheny, Pa. (1893.)

Miers Coryell, New York, the Belleville boiler. (1887.)

The Coulter & McKenzie Machine Co., Bridgeport, Conn. (1894.)

C. R. Cowley, Brooklyn, N. Y. (1895.)

Chas. R. Cowley and Howell C. Cooper, Everett, Mass., Cowley & Cooper boiler. (1901.)

Craig Shipbuilding Co., Long Beach, Calif. (1915.)

J. F. Craig, Toledo, Ohio, Craig water-tube boilers, Nos. 1 and 2. (1896.)

William Cramp & Sons, Philadelphia, Pa., Yarrow type No. 2, and Niclausse water-tube boiler. (1897.)

Crawford & Saunier, Newark, N. J. (Passaic, 1890: Gem, 1891.)

C. B. Crowley & E. B. Browne, Brooklyn, N. Y. (1889.)

Cruichshank, Providence, R. I. (1890.)

H. B. Cumming, Malden, Mass. (1889.)

Osceola Currier, Newark, N. J. (1897.)

Daring type of Thornycroft boiler, Thorpe, Platt & Co., New York, N. Y. (1897.)

A. D. Davis, Yonkers, N. Y. (1899.)

L. D. Davis, Erie, Pa. (1891, 1894, 1898.)

C. F. Davenport, Brooklyn, N. Y., assigned to Empire State Engineering Co., New York, N. Y. (1904.)

J. W. Dawson, Wyandotte, Mich. (1895.)

De Pere-Burton Co., West De Pere, Wis., Burton semisectional water-tube boiler. (1920.)

Charles De Vore, Philadelphia, Pa. (1894.)

Anson C. Dearing, Detroit, Mich. (1894.)

Dearing water-tube boiler, Detroit, Mich. (1897.)

Detroit Screw Works, Detroit, Mich., Taylor boiler. (1898.)

Detroit Water-Tube Boiler Co., Detroit, Mich. (1899.) The Acme boiler. (1902, 1914.)

W. E. Dickey, New York, N. Y., porcupine boiler. (1902.)

Dieter Steam Engine Co., New York, N. Y., C. M. Raymond steam boiler. (1905.)

Dobler boiler attachment or water heater, presented by W. R. Miller, New York, N. Y. (1906.)

Robert Don, Stockton, Calif. (1897.)

George E. Dow, Seattle, Wash. (1894.)

J. J. Driscoll, Stapleton, N. Y. (1894.)

E. N. Drouillard, Wyandotte, Mich., Drouillard water-tube boiler No. 1. (1896.)

John A. Duggan, Boston, Mass., Christiansen marine boiler. (1894.)

P. F. Dundon, San Francisco, Calif. (1916.)

Dyson water-tube boiler, The Charles Ward Engineering Works, Charleston, W. Va. (1920.)

E. G. Durant, for using petroleum. (1888.)

William F. Duval, Jersey City, N. J. (1904.)

F. W. Edwards, Bayonne, N. J. (1899.)

Emergency Fleet Corporation's standard water-tube boiler, Emergency Fleet Corporation, Washington, D. C. (1917; modification, 1917.)

Benjamin P. Emery, Kennebunkport, Me. (1899.)
Henry Ernst, New York, N. Y. (1901.)
A. C. Evans, Norfolk, Va. (1901.)
W. S. Fairchild, Newark, N. J. (1892.)
Farnie & Geer, Syracuse, N. Y.; the Farnie boiler, steam pressure to be allowed on such boiler as the bracing will entitle the same to carry. (1887.)
Thomas Fearon, Yonkers, N. Y. (1893, 1895, 1897.)
A. W. Finlayson, Detroit, Mich. (1896.)
Fenlayson & Popkins, Detroit, Mich. (1893.)
William Flagg, Bayonne, N. J. (1895, 1898.)
William Flaggs, Brooklyn, N. Y. (1891.)
John A. Flajole, Bay City, Mich. (1894.)
Fore River Engine Co., Weymouth, Mass. (1897.)
Foster marine boiler, Power Specialty Co., New York, N. Y. (1917.)
Charles W. Foster, New Haven, Conn. (1892, 1894, 1895.)
Foster Marine Boiler Corporation, New York, N. Y. (formerly the Foster-Wheeler Corporation, New York, N. Y.), Foster waste heat boiler. (1929.)
Walter B. Fowler, Lawrence, Mass. (1892.)
Fowler-Wolfe Sheet Metal Works, Paducah, Ky., improvement in Kidney boiler. (1915.)
H. E. Frauz, steam generator; presented by J. H. Mittendorff, Washington, D. C. (1895.)
H. H. Frederick, New Orleans, La., 3 horsepower. (1893.)
Hugo L. Frederick, copper boiler. (1889)
Horace Furman, Petersburg, Va. (1918.) Two steam drums replaced with one and other modification. (1919.)
R. J. Galbraith, Albany, Oreg. (1911.)
R. J. Galbraith, Coquille, Oreg. (1916; one with cast-steel heads, 1917.)
Siren Galliher, Normal, Ky. (1898.)
C. F. Gallion, Baltimore, Md. (1895.)
Gas Engine & Power Co. and Charles L. Seabury & Co., New York, N. Y. (Types E, Alga, and Enterprise, 1898; Kanawha type, 1899; D improved and E improved, 1903.) See Charles L. Seabury & Co.
James S. Gedeohn, Cleveland, Ohio, pipe boiler. (1892.)
Gem boiler, Crawford & Saunier, Newark, N. J. (1891.)
E. U. Gibbs, Elmira, N. Y. (1894.)
F. G. Gibson, Dorchester, Mass. (1899.)
J. M. Glover, Baldwin, Long Island, N. Y. (1892.)
T. W. Godwin & Co., Norfolk, Va. (1896.)
Goodridge attachment for oil boilers. (1891.)
Thomas Gowen, Seattle, Wash. (1908.)
Gray's steam generator, Providence, R. I. Name changed to Cary's. (1891.)
Samuel M. Gray, Providence, R. I. (1890, 1896.)
Griswold pipe generator, Henry Suttor. (1893.)
Henry Haenel, St. Augustine, Fla. (1894.)
George L. Haman, Detroit, Mich. (1901.)
H. J. Hancock, New York, N. Y., Howard steam generator. (1893.)
T. Hansen, Boston, Mass. (1891.)
George Harden, Detroit, Mich. (1895.)
Gordon H. Hardie, Victoria, British Columbia. (1902.)
A. C. Harding, Chicago, Ill. (1893.)
The Hartley boiler, presented by the Pioneer Iron Works, Brooklyn, N. Y. (1887.)
C. W. Hawkes, Chicago, Ill. (1906.)
Gardener C. Hawkins, Boston, Mass. (1892.)
Hawley Inventions (Inc.), Minneapolis, Minn. Hawley boiler. (1928.)
E. Hayes, Rochester, N. Y. (1891.)
Hazelton Co., water-tube porcupine boiler. (1886.)
S. P. Hedges, Greenport, N. Y. (1885, 1889, 1895.)
Heine safety boiler, by E. D. Meier, St. Louis, Mo. (1895. Superheater presented by Heine Safety Boiler Co., St. Louis, Mo., 1916.)
Heine Safety Boiler Co., Phoenixville, Pa. Meier boiler and superheater. (1917.) Superheater approved, and modifications. (1919.)
A. C. J. Hennig, Seattle, Wash. (1916.)
Frank A. Hensley, San Antonio, Tex., porcupine boiler. **(1906.)**
William H. Herbertson, Cadwallader, Pa. (1896.)
Hermens Steam Motor Co. (Inc.), Portland, Oreg. (1920.)
Herreshoff, Bristol, R. I. (1873, 1878, 1898.)

Type of Herreshoff boiler, presented by Herreshoff Manufacturing Co., Bristol, R. I. (1919.)

Hohenstein, Newark, N. J. (1890.)

Hohenstein marine boiler, presented by Oil City Boiler Works, New York, N. Y. (1907.)

George H. Holmes, Gardiner, Me. (1894.)

Henry A. House, Bridgeport, Conn. (1897.)

Howard steam generator, H. J. Hancock, New York, N. Y. (1893.)

Howden & Co., Glasgow, Scotland. (1915.)

Henry E. Hull, Clinton, Conn. (1899.)

A. M. Hunt, Tacoma, Wash. (1914.)

Hunt straight-tube sectional boiler, Type A, A. M. Hunt & Son, Tacoma, Wash (1922.)

Hunt Type C steam generator, A. M. Hunt, Tacoma, Wash. (1923.)

Hampden Hyde, Rochester, N. Y. (1894.)

V. R. Hyde, Portland, Oreg., the H. Statesmen boiler. (1886.)

F. W. Hyslop, New York, N. Y. (1892.)

International Power Co., Providence, R. I. (1900.)

J. R. Jackson, McKeesport, Pa. (1894.)

Ernest N. Janson, Washington, D. C. (1901.)

J. B. Jardine, San Francisco, Calif. (1894.)

W. E. Jenkins and A. Stokey, Tacoma, Wash. (1900.)

Ernest A. John's boiler, New York, N. Y. (1892.)

Johnston Service Co., Milwaukee, Wis. (1907.)

Geo. E. Jones, Newark, N. J. (1900.)

Robert Joy, Oswego, N. Y. (1918.)

Kaelma boiler. Charles H. Kimball, Plattsburg, N. Y. (1902.)

John R. Karstendick, New Orleans, La. (1884.)

Keep & Co., Portland, Oreg. (1904.)

Chas. Kellogg, Athens, Pa. (1900.)

James W. Kidney, Point Pleasant, W. Va., combination water-tube and fire-tube boiler. (1912. Improvement, 2 shells, 1913; improvement, 1915.) See Fowler-Wolfe Sheet Metal Works.

Changes in construction of Kidney boiler, presented by the Marietta Manufacturing Co., Point Pleasant, W. Va. (1919.)

Charles H. Kimball, Plattsburg, N. Y.; Kaelma boiler. (1902.)

J. H. King, Daytona, Fla. (1899. Modification, 1900, presented by J. B. Sloan, Jacksonville, Fla.)

Charles L. Kraemer, New York, N. Y. (1898.)

Geo. Krill & Bro., Baltimore, Md. (1900.)

C. W. Krotz, New Orleans, La. (1903.)

Kingsford-Webster water-tube boiler, Kingsford Foundry & Machine Works, Oswego, N. Y. (1922.)

J. Lacroix and Ed Rey, New Orleans, La. (1892, 1898.)

L. A. Langmaid, Bath, Me. (1901.)

Laughlin & Co., Pittsburgh, Pa. (1893.)

Geo. Lawley & Son Corporation, Boston, Mass. (1900.)

Harry Lawson, Jersey City, N. J. (1900.)

Harry Lawson, New York, N. Y. (1904.)

Thomas H. Lee, Seattle, Wash. (1917.)

U. G. Lee, Chicago, Ill. (1904.)

Joseph C. Lesley, St. Albans, Vt. (1900.)

Paul W. Lichtenberger, Philadelphia, Pa. (1897.)

Lidback Manufacturing Co., Portland, Me. (1890.)

S. C. Lighthill, Allegheny, Pa. (1900.)

Locomotive boiler; presented by the Locomobile Co. of America, Chicago Ill. (1904.)

L. W. Loomis, Carrollton, Ill. (1896.)

Luther D. Lovekin, of New York Shipbuilding Co., Camden, N. J., type of Thornycroft boiler. (1912.)

W. S. Lowe, Lima, Ohio. (1900.)

J. H. & J. D. Lucas, St. Louis, Mo. (1895.)

Ludlum water-tube boiler. Name changed from Colven water-tube boiler in 1920. Colven boiler approved in 1918. Type B Ludlum boiler approved in 1922. New York Engineering Co., New York, N. Y.

Luippold Bros., Buffalo, N. Y. (1897.)

John H. Lutz, Michigan City, Ind. (1894.)

Lyons Co. furnace boiler, Depere, Wis., Bonson type. (1905.)
William H. C. Lyons, Philadelphia, Pa. (1896.)
Walter MacFarlane, Seattle, Wash. (1900.)
McBride Bros.' boiler, Philadelphia, Pa. (1892.)
W. J. McCaffrey and Charles Hilbert, Sing Sing, N. Y. (1895.)
James McCartney, Mobile, Ala. (1904.)
C. McDonagh, Hancock, Mich. (1892.)
The W. D. McNaull water-tube boiler, Toledo, Ohio. (1905.)
McQueen boiler, Sullivan & Ehler, Albany, N. Y. (1891.)
J. W. McQueen, Detroit, Mich. (1899.)
E. A. Magee, Brooklyn, N. Y. (1893.)
Frank Mahoney, New York, N. Y., a horizontal boiler and a vertical boiler. (1892.)
George H. Mallett, Westchester, N. Y. (1898.)
Manson pipe boiler, John E. Manson, Tacoma, Wash. (1917.)
Marietta Manufacturing Co., Point Pleasant, W. Va., changes in construction of Kidney boiler. (1919.)
Marine Iron Works, Chicago, Ill. (1901.)
G. F. Martin, St. Joseph, Mich. (1897.)
George F. Martin, Benton Harbor, Mich. (1898.)
Tug *Maytham*, Houghton, Mich., copper fire furnace, special. (1899.)
Meier boiler and superheater, Heine Safety Boiler Co., Phoenixville, Pa. (1917.) Superheater approved, and modifications. (1919.)
E. D. Meier, St. Louis, Mo., Heine safety boiler. (1895. Superheater, Heine Safety Boiler Co., St. Louis, Mo., 1916.)
E. W. Millard, Troy, N. Y. (1889.)
August Miller, Jefferson Parish, La. (1897.)
Philip J. Miller, Annapolis, Md. (1903.)
W. R. Miller, New York, N. Y., Dobler boiler attachment or water heater. (1906.)
Miner flash steam generator, Winthrop Waite, New York, N. Y. (1907.)
J. H. Mittendorff, Washington, D. C., H. E. Frauz steam generator. (1895.)
John Mohr & Sons, Chicago, Ill. (1896.)
Joseph Mohr, Chicago, Ill. (1893.)
Monarch water-tube boiler, W. Wesley Werback, Toledo, Ohio. (1919.)
W. J. Montgomery, Detroit, Mich. (1911.)
Edward J. Moore, Philadelphia, Pa. (1899.)
W. W. Moore, Eugene, Oreg. (1894.)
I. G. Morgan, Seattle, Wash. (1894.)
The Morrin Climax steam generator, Clonbrock Steam Boiler Co., Brooklyn, N. Y. (1891. Improved boiler, 1902.)
T. F. Morrin's pipe boiler, J. Castleman, Brooklyn, N. Y. (1898.)
T. F. Morrin, Brooklyn, N. Y., horizontal and vertical types of water-tube boiler. (1900.)
James J. Morris, Nashville, Tenn., flash boiler. (1910.)
C. B. Mosher, Amesbury, Mass. (1891.)
Charles D. Mosher, Mosher Water Tube Boiler Co., New York, N. Y., types A and B. (1904.)
R. Munroe & Son, Pittsburgh, Pa. (1894.)
Nelis steam generator, Joseph J. Nelis, vice president Foster Marine Boiler Corporation, New York, N. Y. (1927.) (Modifications, 1928.)
New York Engineering Co., New York, N. Y. See Ludlum and Colven.
New York Safety Steam Power Co., New York, N. Y., the Worthington boiler. (1891, 1897.)
New York Shipbuilding Co., Camden, N. J. (1902.)
Newport News Shipbuilding & Dry Dock Co., Newport News, Va., type of Thornycroft boiler. (1910.)
Niclausse water-tube boiler; William Cramp & Sons, Philadelphia, Pa. (1897.)
Noel marine tubular boiler, Fabian P. Noel, Washington, D. C. (1918.)
Normand boiler, presented by Bath Iron Works (Ltd.). (1914.)
Northrup Manufacturing Co., Copeland boiler, when composed in all its parts of wrought iron, copper, brass, or steel. (1888.)
Nott marine boiler, Nott Fire Engine Co., Minneapolis, Minn. (1906.)
Harvey T. Nye, Toledo, Ohio. (1908.)
O'Brien water-tube boiler, John O'Brien Boiler Works Co., St. Louis, Mo. (1928.)
Ofeldt's, Newark, N. J. (1889.)
August Ofeldt, New York, N. Y., circular pipe boiler and square pipe boiler. (1909.)

F. W. Ofeldt & Sons, Brooklyn, N. Y. (1901.)
Charles Ogle and James Hall, Jeffersonville, Ind. (1897.)
Oil City Boiler Works, New York, N. Y., Hohenstein marine boiler. (1907.)
William Oldman, jr., Buffalo, N. Y., horizontal and vertical boilers. (1896, 1897.)
James E. Orme and Henry H. Orme, St. Paul, Minn. (1902.)
Marvin E. Otis, Rochester, N. Y. (1891.)
Page Boiler Co., Chicago, Ill. Page sectional water-tube boiler. (1919.)
George E. & Charles A. Painter, Pittsburgh, Pa. (1896.)
D. A. Park, Brooklyn, N. Y. (1897.)
Park water-tube boiler, Aultman & Taylor Machinery Co., Mansfield, Ohio. (1905.)
Parker Boiler Co., Philadelphia, Pa. (1901.)
Charles S. Parker, Orange, Tex. (1895.)
Dr. E. L. Parker, Detroit, Mich. (1898.)
J. E. Parker, Chicago, Ill. (1900.)
Passaic boiler, Crawford & Saunier, Newark, N. J. (1890.)
Pearson Manufacturing Co., Allegheny, Pa., Pittsburgh boiler. (1904.)
Perkins & Richmond, Grand Rapids, Mich. (1894.)
Thomas B. Perkins, Grand Rapids, Mich. (1901; improved porcupine boiler, 1903.)
Archibald Pifer, Braidentown, Fla. (1900.)
Pioneer Iron Works, Brooklyn, N. Y., the Hartley boiler. (1887.)
Pittsburgh boiler, Pearson Manufacturing Co., Allegheny, Pa. (1904.)
William E. Plummer, jr., Buffalo, N. Y. (1896.)
M. H. Plunkett, boiler, Nos. 1 and 2, Baltimore, Md. (1892.)
S. T. Powers, New Orleans, La., porcupine boiler. (1903.)
R. C. Price, Allegheny, Pa. (1895.)
Frank Printz, New Orleans, La. (1895.)
Joseph Provuncher, East Providence, R. I. (1896, 1898.)
Puget Sound Machinery Depot, Seattle, Wash., Scott water-tube boiler. (1921.)
Racine Boat Manufacturing Co., Muskegon, Mich., Racine water-tube boiler. (1904.)
C. M. Raymond steam boiler, the Dieter Steam Engine Co., New York, N. Y. (1905.)
C. Reinhardt, Baltimore, Md. (1895.)
A. L. Rhodes, West Superior, Wis. (1902.)
H. L. Ricks, Eureka, Calif., Salamandrine boiler, manufactured by the Salamandrine Boiler Co., Newark, N. J. (1903.)
Risdon Iron Works, San Francisco, Calif. (1904.)
Risdon Iron and Locomotive Works, San Francisco, Calif. (1910.)
J. B. Rives, St. Paul, Minn., Waterous boiler. (1896.)
E. E. Roberts, New York. (1883.)
Roberts water-tube boiler, New York, N. Y. (1883; improvements in boiler, 1895, 1912; types F, G, H, and I, 1897.)
Roberts Safety Water Tube Boiler Co., Red Bank, N. J.
Roberts water-tube boiler, modification consisting of drum with bumped head. (1912.)
E. Gerry Roberts, Red Bank, N. J.; Star in the Diamond boiler. (1917.)
F. J. Robinson, Detroit, Mich. (1891.)
Josiah Robinson, Watervliet, N. Y. (1904.)
Rochester Machine Tool Works, Rochester, N. Y. (Braggin's boiler, 1889, 1894; Buckley patent water-tube pipe boiler, 1896.)
Willis W. Roff and N. W. Bower, Douglas, Alaska. (1920.)
Charles G. Rogers, water-tube boiler (modified form Roberts coil boiler), Pittsburgh, Pa. (1905.)
James J. Rohan, St. Louis, Mo. (1908.)
Phil Rohan, St. Louis, Mo., Western water-tube boiler. (1898.)
Erdix Rounds, Ownesboro, Ky. (1900.)
D. Rousseau, New York, N. Y. (1894.)
Martin R. Ruble, Newark, N. J. (1891.)
T. W. Rucker, St. Louis, Mo. (1899.)
Ruemmeli-Dawley Manufacturing Co., St. Louis, Mo. Boiler approved, and change in construction. (1919, 1920.)
Jacob Ruf, Newark, N. J. (1899.)
Charles A. Rush, San Francisco, Calif. (1909.)
Salamandrine boiler, manufactured by the Salamandrine Boiler Co., Newark, N. J., presented by H. L. Ricks, Eureka, Calif. (1903.)
W. J. Sanderson, Syracuse, N. Y. (1890.)
Emil Santsche, Eureka, Calif., porcupine boiler. (1903.)

Lewis Saunders, Lawrence, Mass. (1894.)

Stillman Saunders, Providence, R. I. (1893.)

Schwing & Greaud, Gramercy, La. (1904.)

Scott Engine & Construction Co., New York, N. Y. Types A and B. (1908.)

Scott water-tube boiler, Puget Sound Machinery Depot, Seattle, Wash. (1921.)

Charles L. Seabury, Nyack, N. Y. (1889, 1891, 1894, 1895, 1897.) See G, Gas Engine & Power Co. and Charles L. Seabury & Co.

Seachrist & Parker, Erie, Pa. (1893.)

Horace See, New York, N. Y. (1895; improvements Nos. 1 and 2, 1904.)

The Shaffer Machine & Manufacturing Co., Baltimore, Md. (1902.)

J. A. Shaw, Newark, N. J. (1904.)

Isaac E. Shepardson, Providence, R. I. (1896.)

John C. Sherry, Portland, Oreg. (1917.)

The Shipman boiler, for using petroleum. (1886.)

Shortt Duplex Boiler Co., New York, N. Y. (1892.)

William Skelton, jr., Buffalo, N. Y. (1895.)

Halcyon Skinner, Yonkers, N. Y. (1895.)

J. B. Sloan, Jacksonville, Fla., presents boiler of J. H. King, Daytona, Fla. (1899. Modification, 1900.)

Smith patent boiler, presented by E. J. Codd, Baltimore, Md. (1904).

Jacob H. Smith, Baltimore, Md. (1895.)

W. D. Smith, Detroit, Mich. (1892.)

Speedy type of Thornycroft boiler, Thorpe, Platt & Co., New York, N. Y. (1897.)

Spokane Machinery Supply Co., water-tube boiler. (1905.)

Richard Spreckles and Walter J. Wayte, San Francisco, Calif. (1898.)

B. T. Squier, New York, N. Y. (1895.)

Benjamin T. Squier, Brooklyn, N. Y., Towne water-tube boiler. (1906.)

Stanley Motor Carriage Co., Newton, Mass. Shell is made of steel plate wound with steel piano wire. (1912.) New address: Steam Vehicle Corporation of America, Newton, Mass. (1925.)

Star in the Diamond boiler, E. Gerry Roberts, Red Bank, N. J. (1917.)

Stark & Carlyle water-tube boiler, David Stark and Arthur R. Carlyle, San Francisco, Calif. (1912.)

The H. Statesmen boiler, V. R. Hyde, Portland, Oreg. (1886.)

James B. Stead, sectional water-tube boilers, Nos. 1 and 3. (1888.)

Steam Vehicle Corporation of America, Newton, Mass. (New address for Stanley Motor Carriage Co., 1925.)

Wallace Stebbins & Sons, Baltimore, Md. (1900.)

Lee H. Stevens, New Albany, Ind. (1894, 1895.)

Stickney safety steam generator, H. R. Stickney, Portland, Me. (1905.)

Charles Stillwell, Hampton, Va. (1898.)

Harris K. Stroud, Hastings, Minn. (1890.)

Studdert Pipe Boiler Co., Seattle, Wash., improvement in Taylor boiler approved in 1895. (1915.)

Thomas L. Sturtevant, Boston, Mass. (1891, 1892, 1895.)

Sullivan & Ehler, Albany, N. Y., McQueen boiler. (1891.)

Henry Sutter, Griswold pipe generator and Sutter sectional porcupine boiler. (1893.)

George W. Swartz, Decatur, Ala., porcupine boiler. (1902.)

John M. Sweeney, Chicago, Ill., combination fire-tube and water-tube boiler. (1912.)

Tabrett & Lewin, San Francisco, Calif. (1903.)

Paul A. Talbot, Seattle, Wash. (1911; improvement, 1915.)

Taunton Automobile Co., Taunton, Mass., porcupine boiler. (1903.)

Taylor boiler, Detroit Screw Works, Detroit, Mich. (1898.)

Taylor Bros., Trenton, N. J. (1893.)

H. H. Taylor, Detroit, Mich. (1895; improved, 1915.)

Winthrop Thayer, Boston, Mass. (1897.)

W. C. Thompson, Philadelphia, Pa. (1897.)

Thornycroft boiler, Daring and Speedy types. Thorpe, Platt & Co., New York, N. Y. (1897.)

Thornycroft boiler, type presented by Newport News Shipbuilding & Dry Dock Co., Newport News, Va. (1910.)

Thornycroft boiler, type designed by Luther D. Lovekin, of New York Shipbuilding Co., Camden, N. J. (1912.)

Thorpe, Platt & Co., New York, N. Y., Thornycroft boiler, Daring and Speedy types. (1897.)

William R. Thropp, Trenton, N. J. (1906.)

W. J. Tierney and William Marquez, New Orleans, La. (1895.)

B. Louis Toquet, Westport, Conn. (1893, 1894.)

W. M. Towers, Rome, Ga. (1897.)

Towne water-tube boiler, Benjamin T. Squier, Brooklyn, N. Y. (1906.)

John Trasher, New Orleans, La. (1902.)

G. E. Tregurtha, Boston, Mass. (1890, 1892.)

Union marine water-tube boiler, Union Iron Works, Erie, Pa. (1918.)

N. A. Uren, Juneau, Alaska. (1907.) Modification, N. A. Uren, jr., Seattle, Wash. (1912.)

E. H. Vincent, Steam Automotive Corporation, Oakland, Calif., Vincent steam generator. (1928.)

J. E. Vincent, Palatka, Fla., a water-tube boiler and a porcupine boiler. (1902.)

Emil Volk, New York, N. Y. (1894.)

Wadham, 1315 Third Avenue, New York, N. Y. (1890.)

Winthrop Waite, New York, N. Y., the Miner flash steam generator. (1907.)

E. C. Walker Co., Louisville, Ky. (1907.)

J. W. Walters & Co., sectional water-tube boiler. (1888.)

Charles Ward, Charleston, W. Va. (1883; coil boiler and Navy horizontal pipe boiler, 1894; Ward's torpedo-boat boiler, Ward's torpedo-boat boiler No. 2, Ward's straight-tube launch boiler, 1895; Ward's Royal Arch or Navy boiler, 1897.)

Electric welding allowed for construction of headers of Ward water-tube boilers, presented by The Charles Ward Engineering Works, Charleston, W. Va.

The Charles Ward Engineering Works, Charleston, W. Va., Dyson water-tube boiler. (1920.) Superheater to be used in connection with Ward boiler. (1920.)

Charles E. Ward, Charleston, W. Va. (1912.)

Warner & Papst, San Francisco, Calif. (1893.)

George Warrington, Chicago, Ill. (1895, 1902.)

George & James Warrington, Chicago, Ill. (1891.)

S. Waterhouse, Boston, Mass. (1884.)

Waterous boiler, J. B. Rives, St. Paul, Minn. (1896.)

Watson & Peterson, Kansas City, Mo. (1897.)

Egbert P. Watson, Elizabeth, N. J. (1898; modification, 1900; porcupine boiler, 1903.)

Charles M. Weber, Cincinnati, Ohio. (1897.)

W. Wesley Werback, Toledo, Ohio. Monarch water-tube boiler. (1919.)

W. Frank West, Morris Heights, N. Y. (1895.)

Western water-tube boiler, Phil Rohan, St. Louis, Mo. (1898.)

R. Weston & A. M. Lemke, Saginaw, Mich. (1896.)

White patent steam generator, presented by The White Garage, Cleveland, Ohio. (1907.)

Robert White, Brooklyn, N. Y. (1899.)

White-Forster steam generator, The Babcock & Wilcox Co., New York, N. Y. (1909.)

George L. Whittington, Sea Isle City, N. J. (1896.)

Whittlesey Superheating Boiler Co., Cleveland, Ohio. Whittlesey superheating boiler. (1918.)

The Wickes Boiler Co., Saginaw, Mich. Wickes marine water-tube boiler. (1917.) Changes in staying. (1919.) Modified. (1925.)

Wickes Bros., East Saginaw, Mich. (1893.)

James C. Wignall, Philadelphia, Pa., Bretherton boiler. (1897.)

C. A. Wilkerson, Lynn, Mass. (1892.)

Charles P. Willard, Chicago, Ill. (1896.)

D. Y. Williams, South Haven, Mich. (1894.)

Samuel T. Williams, Baltimore, Md. (1894; modification, 1899 and 1900.)

George S. Wolf, West Dover, Ohio. (1901.)

Beder Wood, Moline, Ill. (1899.)

H. T. Wood, Pittsburgh, Pa. (1908.)

O. H. Wood, Seattle, Wash. (1921.)

Worthington water-tube boiler, New York Safety Steam Power Co., New York, N. Y. (1891, 1897.)

Improvement in Worthington water-tube boiler, presented by James Beggs & Co., New York, N. Y. (1918.)

George L. Wright, North Andover, Mass. (1894.)

Benjamin A. Wyatt, Boston, Mass. (1897.)

Theodore H. Wyman, Sebec, Me. (1897.)

Yarrow type No. 2, William Cramp & Sons, Philadelphia, Pa. (1897.)

Yarrow water-tube boiler, New York, N. Y. (1892.)

Robert R. Zell & Co., Baltimore, Md. (1894.)

BOILER BRACES.

John Petty, Lebanon, Pa. (1928.)

MOTION-PICTURE PROJECTORS WITH BOOTHS.

Acme, models 11 and 14, Acme Motion Picture Projector Co., Chicago, Ill. (May, 1921.)

Acme S. V. E., Acme Motion Picture Projector Co., Chicago, Ill. (July, 1923.)

De Vry, types E and U, The De Vry Corporation, Chicago, Ill. (April, 1921.)

Filmo, manufactured by the Bell & Howell Co., Chicago, Ill., presented by the Scientific & Cinema Supply Co. (Inc.), Washington, D. C. When used with a slow-burning film, may be installed without a booth. (June, 1925.)

Graphoscope Junior and Graphoscope Portmanto, presented by the Graphoscope Service Co., Washington, D. C. (August, 1921.)

Holmes, presented by the Southern Moving Picture Corporation, Washington, D. C. (November, 1923.)

Motiograph De Luxe, manufactured by the Enterprise Optical Manufacturing Co., Chicago, Ill., presented by the Southern Moving Picture Corporation, Washington, D. C. (November, 1923.)

New Premier Pathescope Safety Standard, The Pathescope Co. of America (Inc.), New York, N. Y. (August, 1921.)

Popular model Pathescope, The Pathescope Co. of America (Inc.), New York, N. Y. (August, 1921.)

Power's Nos. 6A and 6B, presented by the Nicholas Power Co. (Inc.), New York, N. Y. (September, 1923.)

RCA Photophone Portable Sound Projector System, type PG–5, manufactured by the RCA Photophone Co., New York, N. Y. (March, 1930.)

Simplex, submitted by The Precision Machine Co. (Inc.), New York, N. Y. (January, 1922.)

Victor Safety Cinema, presented by the Victor Animatograph Co., Chicago, Ill. (March, 1923.)

Western Electric Portable Sound Projector Systems 2–P–46 and 3–S–46, submitted by the Electrical Research Products (Inc.), New York, N. Y. (January, 1930.)

Zenith, submitted by Fitzpatrick & McElroy, Chicago, Ill. (June, 1921.)

MOTION-PICTURE PROJECTORS WITHOUT BOOTHS.

New Premier Pathescope, The Pathescope Co. of America (Inc.), New York, N. Y. (October, 1922.)

BOOTHS.

Raven, for moving-picture projectors, Raven Screen Co., New York, N. Y. (November, 1923.)

SPECIFICATIONS FOR CONSTRUCTION OF BOOTHS AND CABINETS FOR FILMS OF MOTION-PICTURE PROJECTORS.

The Steamboat Inspection Service issued a circular letter dated December 9, 1922, addressed to inspectors of the service and others concerned, publishing the following amended specifications for the construction of booths and cabinets for films for motion-picture projectors for use on passenger and other vessels under the jurisdiction of the Steamboat Inspection Service.

These amended specifications provide for constructing booths of transite asbestos boards or asbestos wood (not millboard) without sheet-metal covering, as an alternative of the former method of construction. An increased area of top outlet is required, and other amendments made.

These amended specifications do not apply to booths already installed or to motion-picture projectors specifically allowed by the Supervising Inspector General to be used without booths.

All installations of booths and cabinets shall be approved by inspectors of the Steamboat Inspection Service before the same are allowed to be used.

The slow-burning (acetate cellulose) and the inflammable (nitrocellulose) films for projectors may be used in the booths.

CONSTRUCTION REQUIRED FOR BOOTHS.

Apparatus for projecting motion pictures using inflammable (nitrocellulose) film or slow-burning (acetate cellulose) film shall be contained in a fire-resistive booth or inclosure. It shall be not less than 7 feet in height and of horizontal area not less than 30 square feet for each projector. It shall not be located nearer than 10 feet to the principal exits of the room.

(*a*) *Construction of booth.*—The framework shall be constructed of structural steel angles or tee irons not less than 1½ inches by 1½ inches by ¼ inch, spaced not more than 2 feet apart, or 2 inches by 2 inches by ¼ inch, when spaced from 2 feet to 4 feet apart, and shall be suitably braced to withstand lateral strains. It shall be securely anchored to the deck. The top and sides of the booth shall be covered on the inside of the steel frame with a metal sheet not thinner than No. 20 gauge, inside of which is placed asbestos millboard not less than ¼ inch thick, all properly secured to the framework. Transite asbestos boards or asbestos wood may be used without the sheet-metal covering, provided the distance between supports for the ¼-inch thickness does not exceed 2 feet; for the ⅜-inch thickness, 3 feet; for the ½-inch thickness, 4 feet. The door shall be constructed similar to the booth, and shall be not less than 2 feet wide and 5 feet high, shall be self-closing, fit its frame tightly, and be provided with proper latches. The floor shall be covered with one thickness of ⅜-inch asbestos millboard or transite board.

All joints shall be made smoke proof.

(*b*) *Openings in booth.*—The booth shall be provided with a ventilating inlet on each of the three sides, each to be about 15 inches long and 3 inches high, covered on the outside with wire netting of mesh not greater than one-eighth inch, securely fastened to the wall. In the top of the booth shall be located an air-outlet opening of not less than 100 square inches for each projector connected by a fire-resistive flue to a safe distance above the top deck if the booth is located below deck. The flue shall be securely supported on the framework of the booth. This is designed to provide for an air current through the booth, when operating, of 30 or more cubic feet per minute. If in the given location this is not accomplished, artificial ventilation, as by means of a fan within the booth, shall be introduced.

Two openings shall be provided at the front of the booth, one for the machine and the other for observation by the operator, the maximum area of each opening not to exceed 70 square inches. These openings as well as the air inlets near the bottom of the booth shall be provided with gravity doors made of iron or steel not less than three-sixteenths inch in thickness, of size to overlap the openings by at least 2 inches, and arranged to slide without binding in properly constructed grooves, the joint between door and wall to be smoke-tight when doors are closed; said doors to be held open normally by the use of a fine combustible cord fastened to a fusible link located above the projector which melts at a temperature of 71° C. (160° F.), the whole being so arranged that the doors will close automatically upon severing of the cord or the fusing of the link. Provision shall also be made for closing said doors by hand from the outside of the booth.

(*c*) *General requirements.*—All films on board shall at all times be kept within the operating booths, except as otherwise herein provided. They shall be contained in individual metal boxes, except for the film in the machine and the film immediately before it is placed in or immediately after removal from the machine. Where not over five 5-pound reels are present in the booth they may be placed on incombustible shelves, suitably secured against displacement by the motions of the boat. Where more than 5 reels but not more than 10 reels are present, they shall be kept in closed shelves or cabinets similar in construction to that of the walls of the booth. Where more than ten 5-pound reels are present, they are to be stored in an insulated film cabinet, the cabinet to be constructed per appended specifications.

All rewinding and repair of film shall be conducted within the projecting booth, unless a place with equal safeguards is provided.

When in use the door of the booth shall be closed and when not in use it shall be locked.

The projecting machine is to be suitably secured against displacement by the motions of the boat. All electric wiring and connections shall conform with accepted standards for the given purpose (National Electric Safety Code or National Electric Code). No smoking, matches, or lights other than properly guarded electric lights shall be permitted within the booth.

CONSTRUCTION REQUIRED FOR CABINETS FOR FILMS.

(*a*) The size of a cabinet for the temporary storage of films on board shall not exceed 10 cubic feet, and shall not be used for storage at one time of more than forty 5-pound reels. The reels shall be contained within suitable metal containers and be held on racks in such manner as not to be displaced by the motions of the boat.

(*b*) The cabinet shall be constructed of incombustible materials throughout and shall be tightly inclosed. It may be made of sheet iron of not less than No. 18 U. S. gauge, stiffened with angle irons, double walled, with not less than 2 inches of space between walls, filled with incombustible insulating material, or equivalent construction. The door shall be constructed equivalent to the walls of the cabinet, shall be self-closing, fit closely, and be kept closed and locked at all times except when films are being removed from or placed in the cabinet. If the cabinet is located within the booth, the door of the cabinet shall open outward through the wall of the booth, with tight joints between the booth wall and the cabinet or door. The cabinet shall otherwise be kept in a hold for the storage of hazardous materials. The cabinet shall be secured to the deck by fastenings attached to the outer angle irons.

FIRE EXTINGUISHER REQUIRED.

At least one fire extinguisher of a kind approved by the Board of Supervising Inspectors shall be placed near every such booth and be accessible at all times.

VESSELS REQUIRED BY THE PROVISIONS OF THE GENERAL RULES AND REGULATIONS TO BE SUBJECTED TO AN INCLINING TEST THAT HAVE BEEN INCLINED ON THE DATES SPECIFIED, THE FULL DETAILS IN CONNECTION WITH WHICH ARE ON FILE IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL.

Name of vessel.	Gross tonnage.	Owner.	Port where inclined.	Date inclined or date inclining waived.	Local board requesting inclining.	Remarks.
A. C. Jaynes	148	A. C. Jaynes, Cape Girardeau, Mo.	Grafton, Ill.	Nov. 23, 1925	St. Louis, Mo.	
Admiral	123	Westport & Essex Ferry Co., Plattsburg, N. Y.	Burlington, Vt.	May 5, 1922	Records at Albany, N. Y.	
Admiral Benson	3, 049	Portland California Steamship Co., San Francisco, Calif.	Chester, Pa.	Jan. 24, 1926	Philadelphia, Pa.	Ex-Esther Weems.
Admiral Peoples	3, 133	do.	do.	Dec. 1, 1924	do.	Ex-Mary Weems.
Alaska	4, 658	Alaska Steamship Co., New York, N. Y.	Seattle, Wash.	Mar. 25, 1930	Seattle, Wash.	
Albany	1, 389	New York Central R. R. Co., New York, N. Y.	Mariners Harbor, N. Y.	Nov. 9, 1925	New York, N. Y.	Double-end ferry.
Albatross	691	James A. Ross, Boston, Mass.	Boston, Mass.	July 3, 1928	Boston, Mass.	
Alexander Hamilton	2, 367	Hudson River Day Line, New York, N. Y.	Sparrows Point, Md.	May 12, 1924	Baltimore, Md.	
Alleghany	5, 486	Merchants & Miners Transportation Co., Baltimore, Md.	Kearney, N. J.	Mar. 29, 1923	New York, N. Y.	
America	21, 144	United States Shipping Board, New York, N. Y.	Newport News, Va.	Feb. 23, 1928	Norfolk, Va.	
American Banker	7, 430	do.	Inclining experiment waived.	Apr. 17, 1926	New York, N. Y.	Sister ship of American Trader.
American Farmer	7, 430	do.	do.	do.	do.	Do.
American Legion	2, 089	City of New York, New York, N. Y.	New York, N. Y.	Jan. 28, 1927	do.	
American Merchant	7, 430	United States Shipping Board, New York, N. Y.	Inclining experiment waived.	Apr. 17, 1926	do.	Do.
American Shipper	7, 430	do.	do.	do.	do.	Do.
American Trader	7, 430	do.	New York, N. Y.	Nov. 5, 1920	do.	Ex-Marne.
Angler	199	H. J. Wheeler, Brooklyn, N. Y.	do.	Apr. 21, 1927	do.	
Anna C. Wilson	83	Edward Hintz, Michigan City, Ind.	Michigan City, Ind.	Mar. 18, 1930	Chicago, Ill.	
Ann Arbor No. 7	2, 934	Ann Arbor Boat Co., Frankfort, Mich.	Inclining experiment waived.	Feb. 7, 1925	Milwaukee, Wis.	Similar to Pere Marquette 21.
Arcadia	102	Lorenz & Berntson Co., Tacoma, Wash.	Tacoma, Wash.	Mar. 26, 1930	Seattle, Wash.	
Ariel	168	Port Huron & Sarnia Ferry Co., Port Huron, Mich.	Port Huron, Mich.	July 6, 1927	Port Huron, Mich.	
Au Revoir	342	William W. Stephens, Sheepshead Bay, N. Y.	New York, N. Y.	May 11, 1927	New York, N. Y.	
Baltic	134	City of New York, New York, N. Y.	do.	Oct. 4, 1927	do.	
Bainbridge	313	Kitsap County Transportation Co., Seattle, Wash.	Seattle, Wash.	June 6, 1928	Seattle, Wash.	
Bainbridge	704	Vere Beckwith et al., trustees, Benton Harbor, Mich.	East Boothbay, Me.	June 26, 1922	Portland, Me.	

Vessels required by the provisions of the General Rules and Regulations to be subjected to an inclining test that have been inclined on the dates specified, the full details in connection with which are on file in the office of the Supervising Inspector General—Continued.

Name of vessel.	Gross tonnage.	Owner.	Port where inclined.	Date inclined or date inclining waived.	Local board requesting inclining.	Remarks.
Bear Mountain	941	Daniel F. McAllister, New York, N. Y.	Kearney, N. J	May 24, 1925	New York, N. Y	
Belle Isle	21	John J. Kiley, Detroit, Mich	Detroit, Mich	Apr. 11, 1928	Detroit, Mich	
Belle Island	842	Steamer Belle Island Co. (Inc.), New York, N. Y.	Bayonne, N. J	June 10, 1925	New York, N. Y	
Belle of Chester	64	Chester Ferry Co., Chester, Ill	Chester, Ill	Sept. 28, 1929	St. Louis, Mo	
Berkshire	5, 486	Merchants & Miners Transportation Co., Baltimore, Md.	Inclining experiment waived.	May 9, 1923	New York, N. Y	Sister ship of Alleghany.
Bienville	7, 286	Southern Pacific Co., New York, N. Y.	Tacoma, Wash	Nov. 15, 1924	Seattle, Wash	
Bob White	70	Breece White Manufacturing Co., Arkansas City, Ark.	Arkansas City, Ark	Jan. 14, 1926	Memphis, Tenn	
Bombay	1, 098	T. H. Franklin, New York, N. Y	Baltimore, Md	June 11, 1927	Baltimore, Md	Ex-St. Johns.
Boston	4, 989	Eastern Steamship Lines, Eliot, Me	Sparrows Point, Md	May 21, 1924	do	
Bristol	257	Newport & Providence Ry. Co., Newport, R. I.	Bristol, R. I	Apr. 19, 1922	Providence, R. I	
Britannia	579	Detroit & Windsor Ferry Co., Detroit, Mich.	Detroit, Mich	Feb. 2, 1925	Detroit, Mich	
Cadillac	636	do	do	Apr. 14, 1928	do	
Calamares	7, 244	United Fruit Steamship Corporation, New York, N. Y.	New York, N. Y	Nov. 20, 1927	New York, N. Y	
California	20, 325	American Line Steamship Corporation, New York, N. Y.	Newport News, Va	Dec. 29, 1927	Norfolk, Va	
Calistoga	2, 680	Monticello Steamship Co., San Francisco, Calif.	San Francisco, Calif	Feb. 14, 1927	San Francisco, Calif	
Calypso	33	James H. Paschall et al., Avalon, Calif.	Los Angeles, Calif	July 20, 1928	Los Angeles, Calif	
Cape May	1, 028	Reading Co., Philadelphia, Pa	Inclining experiment waived.	Mar. 19, 1926	Philadelphia, Pa	Sister ship of Chelsea.
Carabobo	2, 916	Atlantic & Caribbean Steam Navigation Co., Wilmington, Del.	New York, N. Y	Apr. 4, 1924	New York, N. Y	
Caracas	3, 365	Atlantic & Caribbean Steam Navigation Co., New York, N. Y.	Newport News, Va	Aug. 20, 1927	Norfolk, Va	
Cary Bird	201	Cairo City Ferry Co., Cairo, Ill	Point Pleasant, W. Va	Apr. 21, 1925	Point Pleasant, W. Va	
Catalina	1, 766	Wilmington Transportation Co., Wilmington, Calif.	Los Angeles, Calif	June 21, 1924	Los Angeles, Calif	
Catskill	652	Montauk & New London Steamboat Co. (Inc.), New London, Conn.	New London, Conn	Mar. 28, 1929	New London, Conn	
Cazadero	1, 682	Northwestern Pacific Ry. Co., San Francisco, Calif.	Tiburon, Calif	Mar. 24, 1927	San Francisco, Calif	
C. C. Webber	319	Upper Mississippi division of the Inland Waterways Corporation, Minneapolis, Minn.	Inclining experiment waived.	Mar. 13, 1929	Dubuque, Iowa	Sister ship of General Ashburn.

Celestine	79	Enea Petranick, Brooklyn, N. Y.	New York, N. Y.	July 1, 1927	New York, N. Y.	
Charles C. Donoghue	756	City of Boston, Mass.	Boston, Mass.	Sept. 20, 1926	Boston, Mass.	
Charles J. Miller	226	Mississippi River Ferry Co., Vicksburg, Miss.	Jeffersonville, Ind.	Apr. 17, 1925	Louisville, Ky.	
Charles W. Galloway	587	Staten Island Ry. Co., New York, N. Y.	Wilmington, Del.	Nov. 28, 1922	Philadelphia, Pa.	
Chatham	5, 649	Merchants & Miners Transportation Co., Baltimore, Md.	Newport News, Va.	May 1, 1926	Norfolk, Va.	
Chauncey M. Depew	652	Hudson River Day Line, New York, N. Y.	Hoboken, N. J.	June 8, 1925	New York, N. Y.	
Chelsea	1, 028	Reading Co., Philadelphia, Pa.	Wilmington, Del.	Sept. 1, 1923	Philadelphia, Pa.	
Chelsea	333	Stamford Oyster Bay Ferries Corporation, New York, N. Y.	Stamford, Conn.	Aug. 29, 1926	New Haven, Conn.	
Cherokee	5, 896	Cherokee-Seminole Steamship Co., New York, N. Y.	Newport News, Va.	June 2, 1925	Norfolk, Va.	
Chicago Harbor No. 4	58	City of Chicago, Chicago, Ill.	Chicago, Ill.	Nov. 6, 1927	Chicago, Ill.	
Chimacum	110	Puget Sound Freight Lines, Seattle, Wash.	Seattle, Wash.	Aug. 27, 1929	Seattle, Wash.	
Chippewa	776	Puget Sound Navigation Co., Seattle, Wash.	Port Orchard, Wash.	Jan. 9, 1930	Seattle, Wash.	
Chris Green	482	Cincinnati, Pomeroy & Charleston Packet Co., Cincinnati, Ohio.	Cincinnati, Ohio	June 15, 1925	Cincinnati, Ohio	
City of Bellingham	258	Navy Yard Route, Seattle, Wash.	Houghton, Wash.	June 15, 1926	Seattle, Wash.	
City of Birmingham	5, 861	Ocean Steamship Co., Savannah, Ga.	Inclining experiment waived.	Nov. 1, 1923	Norfolk, Va.	Sister ship of City of Chattanooga.
City of Chattanooga	5, 861	do	Newport News, Va.	Sept. 22, 1923	do	
City of Chester	418	Wilmington Steamboat Co., Wilmington, Del.	Wilmington, Del.	June 15, 1926	Philadelphia, Pa.	
City of Honolulu	10, 680	Los Angeles Steamship Corporation, Wilmington, Calif.	Los Angeles, Calif.	May 17, 1927	Los Angeles, Calif.	
City of Keansburg	1, 037	Keansburg Steamboat Co., Keansburg, N. J.	Newburgh, N. Y.	Aug. 3, 1926	Albany, N. Y.	
City of Los Angeles	12, 642	Los Angeles Steamship Corporation, Wilmington, Calif.	Los Angeles, Calif.	Feb. 22, 1925	Los Angeles, Calif.	
City of Mukilteo	150	Puget Sound Navigation Co., Seattle, Wash.	Seattle, Wash.	June 10, 1927	Seattle, Wash.	
City of New York	8, 272	American-South African Line (Inc.), New York, N. Y.	Chester, Pa.	Jan. 7, 1930	Philadelphia, Pa.	
City of Port Huron	183	Port Huron & Sarnia Ferry Co., Port Huron, Mich.	Detroit, Mich.	Nov. 10, 1927	Detroit, Mich.	
City of Sacramento	3, 016	Monticello Steamship Co., San Francisco, Calif.	San Francisco, Calif.	Apr. 15, 1927	San Francisco, Calif.	
City of Saginaw 31	3, 327	Pere Marquette Ry. Co., Detroit, Mich.	Manitowoc, Wis.	Nov. 15, 1929	Milwaukee, Wis.	
City of San Rafael	484	Richmond & San Rafael Ferry & Transportation Co., San Francisco, Calif.	Alameda, Calif.	June 11, 1924	San Francisco, Calif.	
City of Victoria	1, 938	Edmonds Victoria Ferry Co., Seattle, Wash.	Baltimore, Md.	May 14, 1928	Baltimore, Md.	Ex-Alabama.
Coamo	7, 057	Coamo Steamship Corporation, New York, N. Y.	Newport News, Va.	Nov. 20, 1925	Norfolk, Va.	
Columbia	255	David K. Cochrane, Chicago, Ill.	Chicago, Ill.	Apr. 18, 1928	Chicago, Ill.	

Vessels required by the provisions of the General Rules and Regulations to be subjected to an inclining test that have been inclined on the dates specified, the full details in connection with which are on file in the office of the Supervising Inspector General—Continued.

Name of vessel.	Gross tonnage.	Owner.	Port where inclined.	Date inclined or date inclining waived.	Local board requesting inclining.	Remarks.
Coronado	502	San Diego & Coronado Ferry Co., San Diego, Calif.	Oakland, Calif	Apr. 8, 1929	San Francisco, Calif	
Creole	6,632	Southern Pacific Co., New York, N. Y.	New York, N. Y	June 29, 1922	New York, N. Y	
Crosline	443	Crosby Direct Line Ferries, Seattle, Wash.	Seattle, Wash	June 29, 1925	Seattle, Wash	
C. R. R. of N. J. No. 26	465	Central R. R. Co. of New Jersey, New York, N. Y.	Inclining experiment waived.	Apr. 4, 1929	New York, N. Y	Sister ship of No. 29.
C. R. R. of N. J. No. 27	465	do	do	do	do	Do.
C. R. R. of N. J. No. 28	465	do	do	do	do	Do.
C. R. R. of N. J. No. 29	465	do	Communipaw, N. J	do	do	
Dan Hardie	259	Peninsula Terminal Co., Miami, Fla	Inclining experiment waived.	Mar. 18, 1926	Baltimore, Md	Sister ship of York.
Daniel A. MacCormack	756	City of Boston, Boston, Mass	do	Aug. 31, 1926	Boston, Mass	Sister ship of Charles C. Donoghue.
Defiance	444	Washington Navigation Co., Tacoma, Wash.	Gig Harbor, Wash	Mar. 21, 1927	Seattle, Wash	
Delta King	1,837	California Transportation Co., San Francisco, Calif.	Stockton, Calif	June 21, 1926	San Francisco, Calif	
Delta Queen	1,837	do	Inclining experiment waived.	July 9, 1926	do	Sister ship of Delta King.
Denali	3,432	Alaska Steamship Co., Seattle, Wash	do	Aug. 26, 1929	Seattle, Wash	Sister ship of Depere.
Depere	3,475	do	Seattle, Wash	do	do	
Derblay	3,475	do	Inclining experiment waived.	do	do	Do.
Detroit	82	John C. Dahmer, Detroit, Mich	Detroit, Mich	Apr. 10, 1928	Detroit, Mich	
Detroit	2,220	Wabash Ry. Co., Detroit, Mich	Inclining experiment waived.	Sept. 1, 1927	do	Similar to Manitowoc.
Dickenson	831	Commercial Pacific Cable Co., New York, N. Y.	Honolulu, Hawaii	Oct. 11, 1923	Honolulu, Hawaii	
District of Columbia	2,128	Norfolk & Washington Steamboat Co., Washington, D. C.	Wilmington, Del	Feb. 18, 1925	Philadelphia, Pa	
Dixie	8,188	Southern Pacific Co., New York, N. Y.	Kearney, N. J	Jan. 8, 1928	New York, N. Y	
Dongan Hills	2,029	City of New York, New York, N. Y.	Staten Island, N. Y	May 20, 1929	New York, N. Y	
Dorchester	5,649	Merchants & Miners Transportation Co., Baltimore, Md.	Inclining experiment waived.	June 5, 1926	Norfolk, Va	Sister ship of Chatham.
Edgar F. Coney	153	Phillip Shore, Tampa, Fla	Tampa, Fla	June 16, 1921	Tampa, Fla	
Edith II	25	Yacht Edith Line, Clayton, N. Y	Clayton, N. Y	June 8, 1926	Oswego, N. Y	
Edith III	49	do	do	May 21, 1928	do	
Edward Riegelmann	593	City of New York, New York, N. Y.	Inclining experiment waived.	July 9, 1925	New York, N. Y	Sister ship of Murray Hulbert.
Edward T. Jeffery	1,578	Western Pacific Ry. Co., San Francisco, Calif.	Oakland, Calif	Apr. 4, 1927	San Francisco, Calif	

Edwin N. Bisso	213	Bisso Ferry Co., New Orleans, La.	Inclining experiment waived.	July 13, 1925	New Orleans, La.	Due to form of construction.
Effort III	80	Frederick B. Wrege, Sheepshead Bay, N. Y.	New York, N. Y.	May 6, 1927	New York, N. Y.	
E. G. Crosby	1,879	Wisconsin & Michigan Transportation Co., Milwaukee, Wis.	Jacksonville, Fla.	Dec. 27, 1921	Jacksonville, Fla.	Ex-City of Miami.
Elfrida	126	Thelma R. Levey, New York, N. Y.	New York, N. Y.	July 15, 1926	New York, N. Y.	
Elizabeth Ann	77	Louis A. Round, New London, Conn.	Groton, Conn.	Mar. 27, 1929	New London, Conn.	
Elmar II	49	Gustav J. Rau, Brooklyn, N. Y.	Inclining experiment waived.	July 22, 1929	New York, N. Y.	Sister ship of Effort III
Elmer W. Jones	277	Brockville & Morristown Transportation Co., Morristown, N. J.	Groton, Conn.	May 1, 1926	New London, Conn.	
El Paso	1,953	Southern Pacific Co., New York, N. Y.	San Francisco, Calif.	Nov. 22, 1924	San Francisco, Calif.	
Emma S	16	Herman A. Schmidt, Detroit, Mich.	Detroit, Mich.	Apr. 12, 1928	Detroit, Mich.	
Evangeline	5,043	Nova Scotia Steamship Corporation, Boston, Mass.	Philadelphia, Pa.	Sept. 21, 1927	Philadelphia, Pa.	
Do.	314	Deep Water Fishing & Exploration Corporation, New York, N. Y.	New York, N. Y.	May 17, 1929	New York, N. Y.	
Exarch	5,839	Export Steamship Corporation, New York, N. Y.	Inclining experiment waived.	July 5, 1929	do.	Sister ship of Excelsior.
Excelsior	5,510	do.	Brooklyn, N. Y.	May 15, 1929	do.	
Exilona	5,989	do.	Inclining experiment waived.	Oct. 4, 1929	do.	Do.
Fairfax	5,649	Merchants & Miners Transportation Co., Baltimore, Md.	do.	Aug. 17, 1926	Norfolk, Va.	Sister ship of Chatham.
Favorite	19	Arthur Olson, Chicago, Ill.	Chicago, Ill.	Aug. 12, 1927	Chicago, Ill.	
Fidus	78	Thomas J. Schmeelk, (B) New York, N. Y.	New York, N. Y.	Aug. 28, 1924	New York, N. Y.	
Fisher	41	F. Schwarzbach, Manhattan Beach, N. Y.	do.	July 1, 1927	do.	
Fishers Island	862	Fishers Island Navigation Co., Fishers Island, N. Y.	Wilmington, Del.	Sept. 16, 1926	Philadelphia, Pa.	
Florida	807	Western Transportation Co., Chicago, Ill.	Chicago, Ill.	Apr. 18, 1928	Chicago, Ill.	
Florida Keys	129	Monroe County, Key West, Fla.	Inclining experiment waived.	Dec. 31, 1927	Jacksonville, Fla.	Sister ship of Monroe County.
Florine	111	Springfield Lumber Co., New Orleans, La.	New Orleans, La.	June 11, 1926	New Orleans, La.	
Frank A. Cunningham	593	City of New York, New York, N. Y.	Inclining experiment waived.	July 9, 1925	New York, N. Y.	Sister ship of Murray Hulbert.
Fred A. Britten	79	Patrick J. Cullnan, Chicago, Ill.	Chicago, Ill.	Mar. 7, 1928	Chicago, Ill.	
Fresno	2,468	Southern Pacific Co., San Francisco, Calif.	San Francisco, Calif.	Mar. 15, 1927	San Francisco, Calif.	
Galvez	87	H. G. Dalehite, Galveston, Tex.	Houston, Tex.	Nov. 19, 1927	Galveston, Tex.	
General	332	Charles Grayson Dimon, New York, N. Y.	New York, N. Y.	June 24, 1927	New York, N. Y.	
General Ashburn	319	Upper Mississippi division of the Inland Waterways Corporation, Minneapolis, Minn.	St. Louis, Mo.	Mar. 13, 1929	Dubuque, Iowa.	

Vessels required by the provisions of the General Rules and Regulations to be subjected to an inclining test that have been inclined on the dates specified, the full details in connection with which are on file in the office of the Supervising Inspector General—Continued.

Name of vessel.	Gross tonnage.	Owner.	Port where inclined.	Date inclined or date inclining waived.	Local board requesting inclining.	Remarks.
General Charles F. Humphrey.		Quartermaster Corps, U. S. Army (Transport Service), Washington, D. C.	Ellis Island, N. Y.	Nov. 17, 1928	Owners' request.	
General Hancock	131	Hutchinson Ferry Co., Alexandria Bay, N. Y.	Alexandria Bay, N. Y.	July 11, 1929	Oswego, N. Y.	
General Humphreys		U. S. Engineer Corps, New Orleans, La.	New Orleans, La.	Nov. 18, 1929	New Orleans, La.	
General Meigs	267	William H. Ellery, New York, N. Y.	New York, N. Y.	Nov. 5, 1925	New York, N. Y.	
George N. Roberts	167	Luling & Destrehan Ferry Co., New Orleans, La.	New Orleans, La.	June 7, 1929	New Orleans, La.	
George Prince	137	Royal Route Co., New Orleans, La.	Inclining experiment waived.	Feb. 6, 1930	do.	Catamaran-type ferry.
George A. Bisso	160	Joseph A. Bisso, New Orleans, La.	New Orleans, La.	Nov. 25, 1927	do.	
George Washington	5,184	Eastern Steamship Lines, New York, N. Y.	Newport News, Va.	Oct. 29, 1924	Norfolk, Va.	
George W. Loft	875	City of New York, New York, N. Y.	Inclining experiment waived.	Aug. 29, 1923	New York, N. Y.	Sister ship of W. R. Hearst.
George W. Miller	223	Mississippi River Ferry Co., Vicksburg, Miss.	do.	Aug. 5, 1926	Louisville, Ky.	Sister ship of Charles J. Miller.
Gertrude S.	20	Herman A. Schmidt, Detroit, Mich.	Detroit, Mich.	Apr. 12, 1928	Detroit, Mich.	
Gig Harbor	159	Washington Navigation Co., Tacoma, Wash.	Gig Harbor, Wash.	Apr. 30, 1925	Seattle, Wash.	
Gillespie	165	Missouri Pacific Ry. Co., St. Louis, Mo.	Cairo, Ill.	Feb. 7, 1923	Evansville, Ind.	
Golden Age	779	Golden Gate Ferry Co., San Francisco, Calif.	Inclining experiment waived.	Dec. 13, 1927	San Francisco, Calif.	Sister ship of Golden Bear.
Golden Bear	779	do.	Alameda, Calif.	May 12, 1927	do.	
Golden City	353	do.	do.	Apr. 14, 1927	do.	Ex-Avin J. Hanford.
Golden Dawn	1,070	Key System Transit Co., Oakland, Calif.	do.	June 5, 1927	do.	
Golden Era	673	do.	do.	May 11, 1927	do.	
Golden Gate	598	Golden Gate Ferry Co., San Francisco, Calif.	do.	June 4, 1927	do.	
Golden Poppy	779	do.	Inclining experiment waived.	Apr. 16, 1927	do.	Sister ship of Golden Bear.
Golden Shore	779	do.	do.	do.	do.	Do.
Golden State	780	do.	Alameda, Calif.	June 23, 1926	do.	
Golden Way	1,138	Key System Transit Co., Oakland, Calif.	Oakland, Calif.	Apr. 6, 1927	do.	
Golden West	594	Golden Gate Ferry Co., San Francisco, Calif.	do.	Apr. 10, 1923	do.	

Goodtime	1,919	Cleveland & Buffalo Transit Co., Cleveland, Ohio.	Cleveland, Ohio	May 25, 1925	Cleveland, Ohio	
Governor Albert C. Ritchie	747	Claiborne-Annapolis Ferry Co., Baltimore, Md.	New York, N. Y	July 8, 1926	New York, N. Y	
Governor Carr	412	Jamestown & Newport Ferry Co., Jamestown, R. I.	Quincy, Mass	Feb. 7, 1927	Boston, Mass	
Governor Moore	405	Electric Ferries, Jersey City, N. J	Camden, N. J	Oct. 27, 1926	Philadelphia, Pa	
Grand Rapids	2,942	Grand Trunk Milwaukee Ferry Co., Milwaukee, Wis.	Manitowoc, Wis	Dec. 8, 1926	Milwaukee, Wis	
Greater Buffalo	7,739	Detroit & Cleveland Navigation Co., Detroit, Mich.	Inclining experiment waived.	Sept. 22, 1924	Detroit, Mich	Sister ship of Greater Detroit.
Greater Detroit	7,739	do	Detroit, Mich	Aug. 25, 1924	do	
Greenwich Village	245	Todd Dry Dock Co., Brooklyn, N. Y	New York, N. Y	Feb. 1, 1928	New York, N. Y	
Halcyon	405	Walkerville & Detroit Ferry Co., Detroit, Mich.	Detroit, Mich	Jan. 25, 1926	Detroit, Mich	
Haleakala	3,679	Inter-Island Steam Navigation Co., Honolulu, Hawaii.	Honolulu, Hawaii	Oct. 19, 1923	Honolulu, Hawaii	
Hampton Roads	710	Chesapeake Ferry Co., Norfolk, Va	Wilmington, Del	July 18, 1925	Philadelphia, Pa	
Harp	17	Carl J. Walter, New York, N. Y	New York, N. Y	May 23, 1929	New York, N. Y	
Harry E. Speas	616	Golden Gate Ferry Co., San Francisco, Calif.	Alameda, Calif	June 3, 1927	San Francisco, Calif	
Havana	6,679	Atlantic, Gulf & West Indies Steamship Lines, New York, N. Y.	Seattle, Wash	Jan. 7, 1928	Seattle, Wash	Ex-Comfort.
Hawaii	850	Inter-Island Steam Navigation Co., Honolulu, Hawaii.	Honolulu, Hawaii	Mar. 6, 1925	Honolulu, Hawaii	
Hawkeye State	14,123	United States Shipping Board, New York, N. Y.	Inclining experiment waived.	Jan. 12, 1921	Baltimore, Md	Sister ship of Golden State.
Hayward	1,653	Key System Transit Co., Oakland, Calif.	Oakland, Calif	Apr. 14, 1923	San Francisco, Calif	
Henry A. Meyer	593	City of New York, New York, N. Y	Inclining experiment waived.	July 9, 1925	New York, N. Y	Sister ship of Murray Hulbert.
Henry Bruckner	593	do	do	do	do	Do.
Hiway	147	Hursey Transportation Co., Slidell, La.	New Orleans, La	Sept. 18, 1926	New Orleans, La	
H. J. Davis	45	Jacob Weber, Sturgeon Bay, Wis	Sturgeon Bay, Wis	Apr. 30, 1929	Milwaukee, Wis	
Hoboken	1,292	Delaware, Lackawanna & Western Ry. Co., New York, N. Y.	Hoboken, N. J	Dec. 16, 1922	New York, N. Y	
Hoquiam	644	Signal Steamship Co., San Francisco, Calif.	San Francisco, Calif	Sept. 26, 1925	San Francisco, Calif	
Howard W. Jackson	379	City of Baltimore, Baltimore, Md	Baltimore, Md	July 28, 1925	Baltimore, Md	
Hualalai	3,092	Inter-Island Steam Navigation Co., Honolulu, Hawaii.	Inclining experiment waived.	Apr. 16, 1929	San Francisco, Calif	Sister ship of Waialeale.
Humuula	961	do	San Francisco, Calif	July 27, 1929	do	
International	56	Glacier Park Hotel Co., Glacier Park, Mont.	Waterton Lake, Mont	Sept. 11, 1927	Seattle, Wash	
Iroquois	1,767	Puget Sound Navigation Co., Seattle, Wash.	Houghton, Wash	July 28, 1928	do	
Iroquois	6,209	New York & Miami Steamship Co., New York, N. Y.	Newport News, Va	Apr. 6, 1927	Norfolk, Va	
Islander	1,089	New England Steamship Co., New Bedford, Mass.	Bath, Me	July 20, 1923	Portland, Me	
Island Queen	986	Coney Island (Inc.), Cincinnati, Ohio.	Cincinnati, Ohio	Apr. 16, 1925	Cincinnati, Ohio	

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Isle of Wight	62	J. Q. Adams, Eclipse, Va	Inclining experiment waived.	June 13, 1929	Norfolk, Va	Sister ship of Miss Washington.
Jackson	224	Florida Ferry Co., South Jacksonville, Fla.	Jacksonville, Fla	July 28, 1927	Jacksonville, Fla	
James E. Sanford	72	Charlevoix-St. James Transit Co., Charlevoix, Mich.	Sturgeon Bay, Wis	Sept. 29, 1927	Milwaukee, Wis	
J. B. John	2,172	Petoskey Transportation Co., Petoskey, Mich.	Manitowoc, Wis	Apr. 2, 1929	do	
John A. Lynch	593	City of New York, New York, N. Y	Inclining experiment waived.	July 9, 1925	New York, N. Y	Sister ship of Murray Hulbert.
John Cadwallader	1,478	Baltimore & Philadelphia Steamboat Co., Philadelphia, Pa.	Wilmington, Del	Sept. 28, 1926	Philadelphia, Pa	
John Cullnan	53	Patrick W. Walsh, Chicago, Ill	Chicago, Ill	Mar. 12, 1928	Chicago, Ill	
John D. Johnson	31	John C. Moore, Detroit, Mich	Marine City, Mich	May 2, 1929	Port Huron, Mich	
John H. McCooey	593	City of New York, New York, N. Y	Inclining experiment waived.	July 9, 1925	New York, N. Y	Do.
John M. Dennis	889	Claiborne-Annapolis Ferry Co., Baltimore, Md.	Portsmouth, Va	June 10, 1929	Norfolk, Va	
John R. Drackett	115	Morgan City & Berwick Ferry Co., Morgan City, La.	Exempt	June 15, 1925	New Orleans, La	Catamaran type ferry.
John R. Emery	422	W. L. Emery, Detroit, Mich	Detroit, Mich	Mar. 10, 1930	Detroit, Mich	
John S. Collins	265	Peninsular Terminal Co., Miami Beach, Fla.	Inclining experiment waived.	June 14, 1926	New London, Conn	Duplicate of Elmer W. Jones.
John W. Weeks	319	Upper Mississippi division of the Inland Waterways Corporation, Minneapolis, Minn.	do	Mar. 13, 1929	Dubuque, Iowa	Sister ship of General Ashburn.
Joseph A. Guider	593	City of New York, New York, N. Y	do	July 9, 1925	New York, N. Y	Sister ship of Murray Hulbert.
Josephine	86	Patrick J. Cullnan, Chicago, Ill	Chicago, Ill	Mar. 19, 1928	Chicago, Ill	
Joseph J. O'Brien	593	City of New York, New York, N. Y	Inclining experiment waived.	July 9, 1925	New York, N. Y	Do.
Joy	41	Henry F. Williams, New York, N. Y	Bronx, N. Y	Nov. 20, 1928	do	
Julius Miller	593	City of New York, New York, N. Y	Inclining experiment waived.	July 9, 1925	do	Do.
Just Brown IV	16	G. W. Brown, Clayton, N. Y	Clayton, N. Y	July 27, 1925	Oswego, N. Y	
Kelley Island	881	Kelley Island Lime & Transport Co., Cleveland, Ohio.	Sandusky, Ohio	July 16, 1929	Toledo, Ohio	
Kenosha	72	James Rolson, Chicago, Ill	Chicago, Ill	Sept. 9, 1929	Chicago, Ill	
Key West	129	Monroe County, Key West, Fla	Inclining experiment waived.	Dec. 31, 1927	Jacksonville, Fla	Sister ship of Monroe County.
Kitsap	526	Kitsap County Transportation Co., Seattle, Wash.	Houghton, Wash	July 1, 1925	Seattle, Wash	

Kittanning	148	Manhattan State Hospital, New York, N. Y.	New York, N. Y.	Mar. 17, 1925	New York, N. Y.	Sister ship of El Paso.
Klamath	1,952	Southern Pacific Co., New York, N. Y.	Inclining experiment waived.	Nov. 22, 1924	San Francisco, Calif.	Sister ship of Fresno.
Lake Tahoe	2,468	Southern Pacific Co., San Francisco, Calif.	do	Dec. 20, 1926	do	Ex-Riverside.
Legonia II	244	John W. Masury, Virginia Beach, Va.	Burlington, Vt.	July 31, 1926	Albany, N. Y.	
Lillian Anne	452	Chesapeake & Delaware Steamboat Co., Baltimore, Md.	Baltimore, Md.	July 23, 1928	Baltimore, Md.	
Lois Pearl	33	William J. Lawrie, Milwaukee, Wis.	Milwaukee, Wis.	Aug. 4, 1928	Milwaukee, Wis.	
Long Beach	411	Wilmington & Penns Grove Transportation Co., Wilmington, Del.	Wilmington, Del.	Mar. 28, 1924	Philadelphia, Pa.	Records at Philadelphia, Pa.
Lord Baltimore	445	Baltimore & Philadelphia Steamboat Co., Philadelphia, Pa.	do	June 2, 1921	Baltimore, Md.	
Lubec	36	Passamaquoddy Ferry & Navigation Co., Lubec, Me.	Lubec, Me.	Apr. 6, 1928	Bangor, Me.	Sister ship of Sainte Ignace.
Mackinaw City	515	State of Michigan, Lansing, Mich.	Inclining experiment waived.	Apr. 12, 1926	Detroit, Mich.	Ex-Bruce.
Madeline	66	Apostle Island Transportation Co., Bayfield, Wis.	Duluth, Minn.	June 29, 1926	Duluth, Minn.	Similar to Grand Rapids.
Madison	2,942	Grand Trunk Milwaukee Ferry Co., Milwaukee, Wis.	Inclining experiment waived.	Apr. 12, 1924	Milwaukee, Wis.	
Madisonville	142	Dendinger Transportation Co., Madisonville, La.	Madisonville, La.	Jan. 25, 1927	New Orleans, La.	
Malolo	17,231	Matson Navigation Co., San Francisco, Calif.	Philadelphia, Pa.	May 21, 1927	Philadelphia, Pa.	Inclined by designers; approved.
Manitowoc	3,093	Wabash Ry. Co., Detroit, Mich.	Manitowoc, Wis.	June 19, 1926	Milwaukee, Wis.	
Margaret	24	Eastern Steamship Lines, Boston, Mass.	Boston, Mass.	Apr. 4, 1929	Boston, Mass.	
Margnita	162	Coastwise Transportation Co., Juneau, Alaska.	Port Blakely, Wash.	Aug. 21, 1926	Seattle, Wash.	
Marionetta	80	Louis Kunze, Elizabeth, N. J.	Mariners Harbor, N. Y.	Mar. 13, 1930	New York, N. Y.	
Marold II	283	Hill White Transportation Co., Green Bay, Wis.	Green Bay, Wis.	Apr. 25, 1927	Milwaukee, Wis.	
Material Service	1,077	Leatham D. Smith Dock Co., Sturgeon Bay, Wis.	Sturgeon Bay, Wis.	Apr. 29, 1929	do	
Maurice Connolly	593	City of New York, New York, N. Y.	Inclining experiment waived.	July 9, 1925	New York, N. Y.	Sister ship of Murray Hulbert.
Maxine II	19	Combined Thousand Island Boat Tours (Inc.), Alexandria Bay, N. Y.	Alexandria Bay, N. Y.	July 10, 1929	Oswego, N. Y.	
Mendocino	2,467	Northwestern Pacific Co., San Francisco, Calif.	Inclining experiment waived.	Dec. 20, 1926	San Francisco, Calif.	Sister ship of Fresno.
Michael J. Perkins	357	City of Boston, Boston, Mass.	East Boston, Mass.	Dec. 23, 1922	Boston, Mass.	
Miss Carolina	63	J. Q. Adams, Eclipse, Va.	Inclining experiment waived.	June 13, 1929	Norfolk, Va.	Sister ship of Miss Washington.
Miss Constance	63	do	do	do	do	Do.
Miss Florida II	39	C. L. Youngblood, Panama City, Fla.	St. Petersburg, Fla.	Nov. 23, 1929	Tampa, Fla.	
Miss Washington	63	J. Q. Adams, Eclipse, Va.	Norfolk, Va.	June 13, 1929	Norfolk, Va.	
Mohawk	5,896	Clyde Steamship Co., New York, N. Y.	Inclining experiment waived.	Dec. 17, 1925	do	Sister ship of Cherokee.
Mongolia	15,575	Atlantic Transport Co., New York, N. Y.	do	June 27, 1929	do	Sister Ship of President Johnson.
Monroe County	129	Monroe County, Key West, Fla.	Jacksonville, Fla.	Dec. 16, 1927	Jacksonville, Fla.	

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Monroe County	174	Monroe County, Key West, Fla.	Jacksonville, Fla.	Mar. 7, 1929	Jacksonville, Fla.	
Mott Haven	245	Todd Dry Dock Co., Brooklyn, N. Y.	Inclining experiment waived.	Feb. 7, 1928	New York, N. Y.	Sister ship of Greenwich Village.
Munamar	3, 440	Munamar Steamship Co., New York, N. Y.	New York, N. Y.	Dec. 23, 1925	do	
Munargo	6, 484	Munargo Steamship Corporation, New York, N. Y.	Hoboken, N. J.	May 17, 1922	do	
Murray Hulbert	593	City of New York, New York, N. Y.	New York, N. Y.	June 6, 1925	do	
Myrtle	236	Alfred Sorensen, Boston, Mass.	Boston, Mass.	Apr. 22, 1926	Boston, Mass.	
Napa Valley	2, 189	Monticello Steamship Co., San Francisco, Calif.	San Francisco, Calif.	Dec. 3, 1926	San Francisco, Calif.	
Naushon	1, 978	New England Steamship Co., Newport, R. I.	Quincy, Mass.	May 14, 1929	Boston, Mass.	
Nautilus II	33	Guiseppe Di Stefano, New York, N. Y.	New York, N. Y.	June 18, 1929	New York, N. Y.	
New Bedford	1, 116	New England Steamship Co., New Haven, Conn.	Quincy, Mass.	May 17, 1928	Boston, Mass.	
New Magnolia	42	Magnolia Springs Transportation Co., Magnolia Springs, Ala.	Mobile, Ala.	Oct. 10, 1927	Mobile, Ala.	
New Orleans	1, 952	Southern Pacific Co., San Francisco, Calif.	Inclining experiment waived.	Nov. 22, 1924	San Francisco, Calif.	Sister ship of El Paso.
New York	4, 989	Eastern Steamship Lines, Eliot, Me.	do	June 14, 1924	Baltimore, Md.	Sister ship of Boston.
Nicholaus	43	Frank Ditchman, Harrisburg, Tex.	Houston, Tex.	Nov. 18, 1927	Galveston, Tex.	
Nonpareil	79	Arbeau Caillavet, Biloxi, Miss.	Biloxi, Miss.	May 29, 1928	Mobile, Ala.	
Noboska	1, 082	New England Steamship Co., New Bedford, Mass.	Bath, Me.	Mar. 27, 1925	Portland, Me.	
North Beach	225	Union Pacific System, Portland, Oreg.	Portland, Oreg.	May 7, 1927	Portland, Oreg.	
Northland	3, 121	Eastern Steamship Lines, Boston, Mass.	Boston, Mass.	June 6, 1924	Boston, Mass.	
North Shore	98	Fred Hintze, Chicago, Ill.	Chicago, Ill.	May 25, 1928	Chicago, Ill.	
Ocean Beach	130	Ocean Beach Ferry Corporation, Bay Shore, N. Y.	Bay Shore, N. Y.	Apr. 30, 1929	New Haven, Conn.	
Ocean City	1, 028	Reading Co., Philadelphia, Pa.	Inclining experiment waived.	Oct. 10, 1923	Philadelphia, Pa.	Sister ship of Chelsea.
Oduna	3, 474	Alaska Steamship Co., Seattle, Wash.	do	Aug. 26, 1929	Seattle, Wash.	Sister Ship of Depere.
Ohio	179	Royal Route Co. (Ltd.), Vicksburg, Miss.	do	Oct. 17, 1924	New Orleans, La.	Due to form of construction.
Ollie K. Wilds	244	do	do	June 15, 1925	do	Catamaran type ferry.
O. S. T.	70	Hursey Transportation Co., Slidell, La.	do	May 20, 1926	do	Due to form of construction.
Palmetto	252	Cooper River Ferry Commission, Charleston, S. C.	Charleston, S. C.	July 7, 1926	Charleston, S. C.	

Pan American	33	Peter Skrmetta, Biloxi, Miss	Biloxi, Miss	May 30, 1928	Mobile, Ala	
Pastores	7, 241	United Fruit Steamship Corporation, New York, N. Y.	New York, N. Y	Nov. 30, 1927	New York, N. Y	
Peralta	2, 075	American Trust Co., San Francisco, Calif.	Oakland, Calif	Mar. 28, 1927	San Francisco, Calif	
Pere Marquette 12	2, 676	Pere Marquette Ry., Detroit, Mich	Inclining experiment waived.	Oct. 18, 1927	Milwaukee, Wis	Sister ship of Manitowoc.
Pere Marquette 21	2, 992	do	Manitowoc, Wis	May 19, 1928	do	
Pere Marquette 22	2, 985	do	Inclining experiment waived.	Apr. 12, 1924	do	Sister ship of Pere Marquette 21.
Peter Stuyvesant	1, 721	Hudson River Day Line, New York, N. Y.	Wilmington, Del	May 18, 1927	Philadelphia, Pa	
Philadelphia	1, 028	Reading Co., Philadelphia, Pa	Inclining experiment waived.	Mar. 19, 1926	do	Sister ship of Chelsea.
Pilgrim	117	Tri-State Ferry Co., Cairo, Ill	do	June 18, 1926	Louisville, Ky	Similar to Charles J. Miller.
Pleasure	489	Detroit & Windsor Ferry Co., Detroit, Mich.	Detroit, Mich	May 8, 1928	Detroit, Mich	
President Cleveland	14, 125	Dollar Steamship Line, San Francisco, Calif.	Newport News, Va	Jan. 19, 1921	Norfolk, Va	Ex-Golden State.
President Johnson	15, 444	do	do	Jan. 15, 1929	do	
President Warfield	1, 814	Baltimore Steam Packet Co., Baltimore, Md.	Inclining experiment waived.	Apr. 27, 1928	Philadelphia, Pa	Sister ship of State of Maryland.
Quillayute	728	Sound Ferry Lines, Edmonds, Wash	Winslow, Wash	May 4, 1927	Seattle, Wash	
Ralph Hicks	76	Arkansas Steamship Co., Pine Bluff, Ark.	Greenville, Miss	Nov. 18, 1922	Memphis, Tenn	
Ray F	14	George W. Maley, Sandusky, Ohio	Sandusky, Ohio	Apr. 23, 1925	Toledo, Ohio	
Redwood Empire	2, 470	Northwestern Pacific R. R. Co., San Francisco, Calif.	Inclining experiment waived.	Mar. 15, 1927	San Francisco, Calif	Sister ship of Fresno.
Restless	475	C. L. Dimon, New York, N. Y	New York, N. Y	June 4, 1927	New York, N. Y	
Riverside	300	City of New York, New York, N. Y	St. George, Staten Island, N. Y.	June 22, 1926	do	
Robert E. Lee	5, 184	Robert E. Lee Steamship Corporation, Wilmington, Del.	Inclining experiment waived.	Dec. 9, 1924	Norfolk, Va	Sister ship of George Washington.
Robert R	35	Sanitary District of Chicago, Chicago, Ill.	Chicago, Ill	Apr. 17, 1928	Chicago, Ill	
Rodman Wanamaker	875	City of New York, New York, N. Y	Inclining experiment waived.	Aug. 29, 1923	New York, N. Y	Sister ship of W. R. Hearst.
Royal Palm	235	Florida Railroad & Navigation Corporation, Everglades, Fla.	Fort Myers, Fla	Dec. 3, 1924	Tampa, Fla	
Sacramento	2, 254	South Pacific Coast Railway Co., San Francisco, Calif.	Oakland, Calif	Jan. 22, 1927	San Francisco, Calif	
Sainte Ignace	515	State of Michigan, Detroit, Mich	Detroit, Mich	Apr. 7, 1926	Detroit, Mich	
Samuel H. Ashbridge	268	City of Philadelphia, Philadelphia, Pa.	Philadelphia, Pa	Mar. 11, 1930	Philadelphia, Pa	
San Jose	630	Rodeo Vallejo Ferry Co., Rodeo, Calif	Alameda, Calif	June 28, 1927	San Francisco, Calif	
San Leandro	1, 653	Key System Transit Co., Oakland, Calif.	Inclining experiment waived.	Apr. 14, 1923	do	Sister ship of Hayward.
Santa Barbara	8, 054	Grace Steamship Line, New York, N. Y.	do	Apr. 26, 1928	New York, N. Y	Sister ship of Santa Maria.
Santa Clara	9, 366	do	Camden, N. J	Feb. 22, 1930	Philadelphia, Pa.	
Santa Inez	5, 538	do	Copenhagen, Denmark	Mar. 22, 1929	New York, N. Y	Inclined by designers; approved.

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Santa Maria	7,734	Grace Steamship Line, New York, N. Y.	Haverton Hill-on-Tees, England.	Mar. 25, 1928	New York, N. Y	Inclined by designers, approved.
Santa Rita	5,538	do	Inclining experiment waived.	Mar. 22, 1929	do	Sister ship of Santa Inez.
Santa Rosa	2,465	Northwestern Railway Co., San Francisco, Calif.	do	Mar. 15, 1927	San Francisco, Calif	Sister ship of Fresno.
Scandia II	21	A. A. Hernage and J. M. Flaxman, Santa Monica, Calif.	Los Angeles, Calif	May 23, 1928	Los Angeles, Calif	
Seminole	5,896	Cherokee-Seminole Steamship Co., New York, N. Y.	do	July 16, 1925	Norfolk, Va	Sister ship of Cherokee.
Shasta	1,782	Southern Pacific Co., San Francisco, Calif.	San Francisco, Calif	Oct. 31, 1922	San Francisco, Calif	
Shawnee	6,209	New York and Miami Steamship Corp., New York, N. Y.	Inclining experiment waived.	May 27, 1927	Norfolk, Va	Sister ship of Iroquois.
Skater	92	Thomas Young, Chicago, Ill	Michigan City, Ind	Apr. 24, 1928	Chicago, Ill	
South Shore	68	William J. Lawrie, Milwaukee, Wis	Milwaukee, Wis	Aug. 4, 1928	Milwaukee, Wis	
S. S. Thorpe	319	Upper Mississippi division of the Inland Waterways Corporation, Minneapolis, Minn.	Inclining experiment waived.	Mar. 13, 1929	Dubuque, Iowa	Sister ship of General Ashburn.
St. Andrews	240	William M. Mills, New York, N. Y	Brooklyn, N. Y	Mar. 24, 1923	New York, N. Y	
St. Mihiel	7,555	Quartermaster Corps, United States Army (Transport Service), Washington, D. C.	do	Nov. 16, 1928	Owners' request	
St. Tammany	103	J. B. Howze and F. M. Comfort, Slidell, La.	Slidell, La	June 30, 1924	New Orleans, La	
State of Delaware	814	Wilmington Steamboat Co., Wilmington, Del.	Wilmington, Del	June 10, 1923	Philadelphia, Pa	
State of Maryland	1,783	Baltimore Steam Packet Co., Baltimore, Md.	Baltimore, Md	Dec. 28, 1922	Baltimore, Md	
State of Pennsylvania	814	Wilmington Steamboat Co., Wilmington, Del.	Inclining experiment waived.	June 18, 1923	Philadelphia, Pa	Sister ship of State of Delaware.
State of Virginia	1,783	Baltimore Steam Packet Co., Baltimore, Md.	do	Jan. 27, 1923	do	Sister ship of State of Maryland.
Stockton	2,467	Southern Pacific Co., San Francisco, Calif.	do	Mar. 15, 1927	San Francisco, Calif	Sister ship of Fresno.
Tanana	3,474	Alaska Steamship Co., Seattle, Wash	do	Aug. 26, 1929	Seattle, Wash	Sister ship of Depere.
T. B. Banner	42	Fred Hintze, Chicago, Ill	Chicago, Ill	Apr. 19, 1928	Chicago, Ill	
Tenkenas	447	State of New York, Albany, N. Y	Inclining experiment waived.	Oct. 26, 1929	New London, Conn	Sister ship of Ward's Island.
Theodore Roosevelt	1,955	Maritime Securities Co., Manitowoc, Wis.	Manitowoc, Wis	May 25, 1927	Milwaukee, Wis	
The Straits of Mackinac	733	State of Michigan, Lansing, Mich	Detroit, Mich	June 11, 1928	Detroit, Mich	

Tinicum	320	Stamford Oyster Ferries Corporation, Stamford, Conn.	Stamford, Conn.	May 22, 1929	New Haven, Conn.	
Traveler	117	Tri-State Ferry Co., Cairo, Ill.	Inclining experiment waived.	Mar. 17, 1927	Louisville, Ky.	Similar to Charles J. Miller.
Two Brothers	32	Jakobsen & Peterson (Inc.), Brooklyn, N. Y.	Bayonne, N. J.	Aug. 31, 1929	New York, N. Y.	
Uncle Sam	22	Combined 1,000 Island Boat Tours (Inc.), Alexandria Bay, N. Y.	Alexandria Bay, N. Y.	June 7, 1926	Oswego, N. Y.	
U. S. A.	19	Dorothy Sobota, Chicago, Ill.	Chicago, Ill.	Apr. 21, 1928	Chicago, Ill.	
U. S. Grant	9,410	Quartermaster Corps, United States Army (Transport Service), Washington, D. C.	San Francisco, Calif.	Feb. 27, 1929	Owners' request.	
Victor	120	Joseph A. Bisso, New Orleans, La.	New Orleans, La.	Sept. 22, 1926	New Orleans, La.	
Viking	1,300	George F. Baker, jr., New York, N. Y.	Newport News, Va.	Apr. 10, 1929	Norfolk, Va.	
Virginia	20,325	American Line Steamship Corporation, New York, N. Y.	do.	Nov. 3, 1928	do.	
Virginia Lee	2,158	Pennsylvania R. R. Co., Philadelphia, Pa.	Quincy, Mass.	Oct. 2, 1928	Boston, Mass.	
V. J. Kurzweg	250	Sherburne Transportation Co., Plaquemine, La.	New Orleans, La.	Oct. 11, 1926	New Orleans, La.	
Wabash	3,366	Wabash Ry. Co., St. Louis, Mo.	Inclining experiment waived.	June 9, 1927	Toledo, Ohio.	Similar to *Pere Marquette 2.*
Waialeale	3,092	Inter-Island Steam Navigation Co., Honolulu, Hawaii.	San Francisco, Calif.	May 18, 1928	San Francisco, Calif.	
Ward's Island	447	State of New York, Albany, N. Y.	Groton, Conn.	Oct. 7, 1929	New London, Conn.	
Watco	99	Wahkiakum Transportation Co., Cathlamet, Wash.	Astoria, Oreg.	Sept. 22, 1929	Portland, Oreg.	
W. B. Foshay	1,255	Northland Transportation Co., Seattle, Wash.	Kirkland, Wash.	Aug. 21, 1929	Seattle, Wash.	
Welcome	58	William P. Jepson, Washington Island, Wis.	Sturgeon Bay, Wis.	Apr. 30, 1929	Milwaukee, Wis.	
William Penn	467	Trenton-Philadelphia Steamboat Co., Wilmington, Del.	New Orleans, La.	Apr. 26, 1916	New Orleans, La.	Ex-Mandeville.
Wisconsin	40	William P. Jepson, Washington Island, Wis.	Sturgeon Bay, Wis.	Aug. 3, 1928	Milwaukee, Wis.	
W. J. Quinlan	195	Rock Island Davenport Ferry Co., Rock Island, Ill.	Rock Island, Ill.	Apr. 4, 1926	Dubuque, Iowa.	
Wollochet	148	Skansie Ferry Co., Gig Harbor, Wash.	Gig Harbor, Wash.	Apr. 27, 1925	Seattle, Wash.	
W. R. Hearst	1,553	City of New York, New York, N. Y.	Staten Island, N. Y.	July 9, 1923	New York, N. Y.	
Yarmouth	5,043	Nova Scotia Steamship Corporation, Boston, Mass.	Philadelphia, Pa.	June 26, 1927	Philadelphia, Pa.	
Yerba Buena	2,075	Key System Transit Co., Oakland, Calif.	Inclining experiment waived.	Jan. 21, 1927	San Francisco, Calif.	Sister ship of Peralta.
York	260	W. T. Ashe, Newport News, Va.	Baltimore, Md.	Sept. 3, 1925	Baltimore, Md.	
Yorktown	1,547	Chesapeake Steamship Co., Baltimore, Md.	Newport News, Va.	May 12, 1928	Norfolk, Va.	
Yosemite	1,782	Southern Pacific Co., San Francisco, Calif.	Inclining experiment waived.	Oct. 31, 1922	San Francisco, Calif.	Sister ship of Shasta.
Youngstown	1,553	Erie Land & Improvement Co., New York, N. Y.	Staten Island, N. Y.	Feb. 14, 1923	New York, N. Y.	

COUNTRIES WITH WHICH THE UNITED STATES HAS RECIPROCAL INSPECTION RELATIONS.

Country.	Ordered by department circular.		Country.	Ordered by department circular.	
	Number.	Date.		Number.	Date.
Australia	292	Aug. 7, 1925	Great Britain	73	May 8, 1905
Belgium	289	July 15, 1922	Hong Kong	293	Jan. 26, 1929
Bengal	291	May 4, 1925	Japan	135	Nov. 26, 1906
Bombay	290	July 17, 1924	Netherlands	96	Aug. 1, 1902
Denmark	51	Oct. 10, 1904	New Zealand	217	Oct. 25, 1910
Dominion of Canada	74	May 8, 1905	Norway	200	Nov. 4, 1909
France	47	May 3, 1902	Spain	284	Sept. 15, 1920
Germany	30	Mar. 12, 1903	Sweden	287	May 28, 1921

Library
Pacific Salmon Investigations
U. S. Fish & Wildlife Service
Seattle, Washington.

MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF VALVES AND FITTINGS.

Acme Steel Co., Glassmere, Pa.
Adrian Steel Casting Co., Adrian, Mich.
Advance Machine Co., Los Angeles, Calif.
A. Gilbert & Sons Brass Foundry Co., St. Louis, Mo.
Ajax Foundry Co., Anniston, Ala.
Ajax Foundry Co., San Francisco, Calif.
Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.
Albina Engine & Machine Works (Inc.), Portland, Oreg.
Alderton Dock Yards (Ltd.), Brooklyn, N. Y.
Alexander R. Boyce (Inc.), Long Island City, N. Y.
Alex. Miller & Bro. (Inc.), Jersey City, N. J.
Algiers Iron Works, New Orleans, La.
Allen Engineering Co., Memphis, Tenn.
Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Almy Water Tube Boiler Co., Providence, R. I.
American Brown Boveri Electric Corporation, Camden, N. J.
American District Steam Co., North Tonawanda, N. Y.
American Foundry & Construction Co., Pittsburgh, Pa.
American Hoist & Derrick Co., St. Paul, Minn.
American Machine & Engineering Corporation, Pittsburgh, Pa.
American Machine & Manufacturing Co., Atlanta, Ga.
American Marine Equipment Corporation, Elizabeth, N. J.
American Metallurgical Corporation, Philadelphia, Pa.
American Radiator Co., Buffalo, N. Y.
American Shipbuilding Co., Cleveland, Ohio.
American Steam Gauge & Valve Manufacturing Co., Boston, Mass.
American Steel Foundries, Chester, Pa
American Steel Foundries, Indiana Harbor, Ind.
Ames Shipbuilding & Dry Dock Co., Seattle, Wash.
Anniston Steel Co., Anniston, Ala.
Arthur Tickle Engineering Works, Brooklyn, N. Y.
Astoria Marine & Iron Works, Astoria, Oreg.
Atlantic Basin Iron Works, Brooklyn, N. Y.
Atlantic Steel Castings Co., Chester, Pa.
Atlas Imperial Engine Co., Oakland, Calif.
Atlas Valve Co. (Inc.), New York, N. Y.
Atwood & Morrill Co., Salem, Mass.
A. W. Cadmen Manufacturing Co., Pittsburgh, Pa.
A. W. Cash Co., Decatur, Ill.
Axelson Machine Co., Los Angeles, Calif.
Badenhausen Co., Boundbrook, N. J.
Bailey Meter Co., Cleveland, Ohio.
Baker Iron Works, Los Angeles, Calif.
Baker Valve Co., Minneapolis, Minn.
Baldt Steel Co., Wilmington, Del.
Barbour Stockwell Co., Cambridge, Mass.
Barco Manufacturing Co., Chicago, Ill.
Bath Iron Works, Bath, Me.
Bayonne Steel Casting Co., Bayonne, N. J.
Bay Shore Foundry Co., Pensacola, Fla.
Beaumont Iron Works, Beaumont, Tex.
Beaver State Motor Co., Gresham, Oreg.
Benjamin Fox's Sons (Inc.), New York, N. Y.
Bertelsen & Petersen Engineering Co., Boston, Mass.
Best Steel Casting Co., San Francisco, Calif.
Bethlehem Shipbuilding Corporation (Ltd.) (Moore Plant), Elizabeth, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
Bethlehem Steel Co., Sparrows Point, Md.
B. Hoffman Manufacturing Co., Milwaukee, Wis.
Bingham & Taylor (W. P. Taylor, successor), Buffalo, N. Y.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Birmingham Iron Foundry Co., Derby, Conn.
Blackwood Electric Steel Corporation, Parkersburg, W. Va.
B. M. Martin Brass Works, New York, N. Y.
Boat Repairing Corporation, New York, N. Y.
Boston Navy Yard, Charlestown, Mass.
Bound Brook Engine & Manufacturing Co., Philadelphia, Pa.
Briggs Engineering Co., Brooklyn, N. Y.
Brunswick Marine Construction Corporation, Brunswick, Ga.
Buckeye Engine Co., Salem, Ohio.
Buckeye Iron & Brass Works, Dayton, Ohio.
Burt Hicks, Portland, Oreg.
California Shipbuilding Co., Long Beach, Calif.
Calumet Foundry & Machine Co., East Chicago, Ill,
Canadian Allis-Chalmers Co., Toronto, Canada.
Cann & Saul, Philadelphia, Pa.
Capstaff-Hunter Turbine Works (Inc.), Hoboken, N. J.
Carlson & Son, New York, N. Y.
Carthage Machine Co., Carthage, N. Y.
Cassidy Co. (Inc.), Long Island City, N. Y.
Central Brass Manufacturing Co., Cleveland, Ohio.
Central Engineering Co., Boston, Mass.
Central Foundry Co., New York, N. Y.
Central Valve Manufacturing Co., Chicago, Ill.[1]
Centrifix Corporation, Cleveland, Ohio.
C. F. Braun & Co., San Francisco, Calif.
Chaplin-Fulton Manufacturing Co., Pittsburgh, Pa.
Charles Hegewald Co., New Albany, Ind.
Charles L. Seabury & Co., Morris Heights, N. Y.
Charles Perkes Co., Philadelphia, Pa.
Charleston Dry Dock & Machine Co., Charleston, S. C.
Chester Steel Casting Co., Chester, Pa.
C. H. Evans Co. (Inc.), San Francisco, Calif.
Cleveland Pneumatic Tool Co., Cleveland, Ohio.
Cleveland Steam Gauge Co., Cleveland, Ohio.
Clinton Dry Docks (Inc.), Brooklyn, N. Y.
Clyde Iron Works, Duluth, Minn.
Cochrane Corporation, Philadelphia, Pa.
Columbia Machine Works, San Francisco, Calif.
Columbia Manufacturing Co., Columbia, Pa.
Columbia Steel Co., San Francisco, Calif.
Columbian Bronze Corporation, New York, N. Y.
Commercial Iron Works, Portland, Oreg.
Condenser Service & Engineering Co. (Inc.), Hoboken, N. J.
Connolly Steel Casting Co., Chelsea, Mass.
Cornell Steamboat Co., Rondout, N. Y.
Coy Valve Co., Chehalis, Wash.
Craig Foundry Co., Brooklyn, N. Y.
Craig Shipbuilding Co., Long Beach, Calif.
Crane Co., Washington, D. C.
Crosby Steam Gage & Valve Co., Boston, Mass.
C. R. Reichel, San Francisco, Calif.
Crucible Steel Co. of America, Philadelphia, Pa.
Daniel E. Donohue, Buffalo, N. Y.
Danville Iron & Steel Co., Danville, Pa.
Davison Chemical Co., Baltimore, Md.
Dayton Steel Foundry Co., Dayton, Ohio.
Dedman Foundry & Machine Co., Houston, Tex.
Deemer Steel Castings Co., New Castle, Del.
Defoe Boat & Motor Works, Bay City, Mich.
De Laval Steam Turbine Co., Trenton, N. J.

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[1] This company has taken over the O'Malley-Beare Valve Co.

De Mattia Bros., Garfield, N. J.
Department of Docks and Ferries, New York, N. Y.
Detroit Ball Valve Co., Detroit, Mich.
Detroit Brass Works, Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Detroit River Iron Works, Detroit, Mich.
Detroit Shipbuilding Co., Detroit, Mich
Detroit Steel Casting Co., Detroit, Mich.
Diamond Power & Specialty Corporation, Detroit, Mich.
Dibert, Bancroft & Ross Co., New Orleans, La.
D. M. Swain Marine Engine Works, Stillwater, Minn.
Dodge Manufacturing Co., Mishawaka, Ind.
Dodge Steel Co., Tacony, Philadelphia, Pa.
Doran Bros., Seattle, Wash.
Doran Manganese Bronze Co., Brooklyn, N. Y.
Downey Shipbuilding Corporation, New York, N. Y.
Dri-Steam Valve Corporation, Pittsburgh, Pa.
Dubus Co. (Inc.), New Orleans, La.
Dunn and Flynn Brass Works, New York, N. Y.
Duquesne Steel Foundry Co., Pittsburgh, Pa.
Eagle Brass Foundry Co., Seattle, Wash.
Eastern Steamship Lines (Inc.), Boston, Mass.
Eastern Steel Castings, Newark, N. J.
Easton Tool & Machine Co., Easton, Pa.
Eaton Iron Works, Lakeland, Fla.
E. A. Williams & Son, Jersey City, N. J.
Economy Iron Works (Inc.), New Orleans, La.
Edw. Renneburg & Sons Co., Baltimore, Md.
E. J. Codd Co., Baltimore, Md.
Elizabeth City Iron Works & Supply Co., Elizabeth City, N. C.
Elsesser Engineering Co., Brooklyn, N. Y.
Empire Foundry Co., Oakland, Calif.
Enterprise Brass Foundry Co., Los Angeles, Calif.
Enterprise Brass Foundry, Seattle, Wash.
Enterprise Brass Works, Baltimore, Md.
Enterprise Foundry Co., San Francisco, Calif.
Erie City Iron Works, Erie, Pa.
Erie Forge Co., Erie, Pa.
Ernst & Co., Newark, N. J.
Essex Foundry Co., Newark, N. J.
Everlasting Valve Co., New York, N. Y.
Everett Steel Co., Everett, Wash.
Excelsior Brass Works, San Francisco, Calif.
Exeter Machine Works, West Pittston, Pa.
Farrar & Trefts (Inc.), Buffalo, N. Y.
Farrell-Cheek Steel Foundry Co., Sandusky, Ohio.
Federal Shipbuilding Co., Kearney, N. J.
Federal Steel Foundry Co., Chester, Pa.
Fernholtz Machinery Co., Los Angeles, Calif.
F. G. Dyer Brass Foundry & Machine Works, San Francisco, Calif.
F. H. Koretke Brass & Manufacturing Co. (Ltd.), New Orleans, La.
F. Holtz Co., Evansville, Ind.
Fire Prevention Co., Providence, R. I.
Fitchburg Steam Engine Co., Fitchburg, Mass.
Fleck Bros. Co., Philadelphia, Pa.
Flower-Stephens Manufacturing Co., Detroit, Mich.
Flynn Bros., Hoboken, N. J.
Ford Bros. & Co., Philadelphia, Pa.
Fore River Shipbuilding Co., Quincy, Mass.
Foster Engineering Co., Newark, N. J.
Fox Hill Foundry, Hoboken, N. J.
Freed Heater Co., Collegeville, Pa.
Garden City Foundry Co., Chicago, Ill.
Gas Engine & Power Co., Morris Heights, N. Y.
General Electric Co., Erie, Pa.
General Electric Co., Everett, Mass.
General Engineering & Dry Dock Co., Oakland, Calif.
General Engineering Works, Philadelphia, Pa.
General Fire Extinguisher Co., Auburn, R. I.
General Ordnance Co., Denver, Colo.
George B. Limbert & Co., Chicago, Ill.
George H. Smith Steel Casting Co., Milwaukee, Wis.
George H. Waters Co., Mariners Harbor, N. Y.
George Krouse, Jersey City, N. J.
G. E. Witt Co. (Inc.), San Francisco, Calif.
Gilbert M. Edgett & Co., Brooklyn, N. Y.
Gillett, Eaton & Squire, Lake City, Minn.
Globe Shipbuilding Co., Superior, Wis.
Glover Machine Works, Marietta, Ga.
G. M. Davis Regulator Co., Chicago, Ill.
G. M. Standifer Construction Corporation, Vancouver, Wash.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Goodman Engine & Machine Co., Pittsburgh, Pa.
Grays Harbor Iron & Machine Works, Hoquiam, Wash.
Grays Harbor Iron & Steel Co., Hoquiam, Wash.
Great Lakes Engineering Works, Detroit, Mich.
Great Lakes Towing Co., Cleveland, Ohio.
Greenmount Iron & Manufacturing Co., Baltimore, Md.
Gruendler Machine Co., St. Louis, Mo.
Grymes Engineering Co., Jersey City, N. J.
Gulf Iron Works, Tampa, Fla.
Gulf Machine Works, Pensacola, Fla.
Gyro Metal Works, Norfolk, Va.
Hallidie Co., Spokane, Wash.
H. A. May Foundry Co., Philadelphia, Pa.
Hammel Oil Burning Equipment Co., Providence, R. I.
Hanlon Dry Dock & Shipbuilding Co., Oakland, Calif.
Harlan & Hollingsworth Corporation, Wilmington, Del.
H. Belfield Co., Philadelphia, Pa.
H. E. Crook Co., Baltimore, Md.
Hendricks Manufacturing Co., Seattle, Wash.
Henry Davis & Co., San Francisco, Calif.
Herman J. Scheubner, New York, N. Y.
Herreshoff Manufacturing Co., Bristol, R. I.
Hess-Martin Iron Works, Portland, Oreg.
Hewes & Phillips Iron Works, Newark, N. J.
H. G. Trout Co., Buffalo, N. Y.
Hilles & Jones Co., Wilmington, Del.
H. J. Kaltenthaler, Philadelphia, Pa.
Hodges Boiler & Machine Works Co. (Inc.), Mobile, Ala.
Home Industry Iron Works, Mobile, Ala.
Homestead Valve Manufacturing Co., Pittsburgh, Pa.
Honolulu Iron Works, Honolulu, Hawaii. [2]
Honolulu Welding & Machine Co. (Ltd.), Honolulu, Hawaii.
Hudson Peck Machine Products Co., Philadelphia, Pa.
Hughes Tool Co., Houston, Tex.
Illinois Engineering Co., Chicago, Ill.
Industrial Brownhoist Corporation, Cleveland, Ohio.
Interlake Engineering Co., Cleveland, Ohio.
Ira S. Bushey & Sons, Brooklyn, N. Y.
Isaac G. Johnson, New York, N. Y.
Jahncke Dry Dock & Ship Repair Co., New Orleans, La.
James J. Lacey Co., Baltimore, Md.
James Jones Co., Los Angeles, Calif.
James Rees & Sons Co., Pittsburgh, Pa.
Jarecki Manufacturing Co., Erie, Pa.
J. E. Lonergan Co., Philadelphia, Pa.
Jenkins Bros., New York, N. Y.
Jenkins Manufacturing Co., Bloomfield, N. J.
Jewell Steel & Malleable Co., San Francisco, Calif.
J. F. Duthis & Co., Seattle, Wash.
John H. Dialogue & Son, Camden, N. J.
John J. Tighe Brass & Iron Foundry, Brooklyn, N. Y.
John M. Sullivan Co., New York, N. Y.
John Simmons Co., New York, N. Y.
Johnston Bros., Ferrysburg, Mich.
John W. Barton, Cleveland, Ohio.
John Wood Iron Works, Portland, Oreg.
Joseph B. Taylor Brass Foundry, Baltimore, Md.
Joseph E. Phelan, Brooklyn, N. Y.
Joseph F. Schiller, Philadelphia, Pa.
Joshua Hendy Iron Works, San Francisco, Calif.
Judson Governor Co., Rochester, N. Y.
Julian D'Este Co., Boston, Mass.
Kelly Valve Co., Muskegon, Mich.
Kensington Shipyard & Drydock Co., Philadelphia, Pa.
Keystone Iron Works (Inc.), Los Angeles, Calif.
Keystone Supply & Manufacturing Co., Philadelphia, Pa.
Kieley & Mueller, New York, N .Y
Kingsford Foundry & Machine Works, Oswego, N. Y.
Kitson Co., Philadelphia, Pa.
Klingerit (Inc.), New York, N. Y.

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[2] This company has taken over Catton, Neill & Co.

Klipfel Manufacturing Co., Chicago, Ill.
Knowlson & Kelley Co., Troy, N. Y.
Kutztown Foundry & Machine Co., Kutztown, Pa.
Lagonda Manufacturing Co., Springfield, Ohio.
Lake Erie Boiler Works, Buffalo, N. Y.
Lake Erie Foundry Co., Buffalo, N. Y.
Lansdale Foundry Co., Lansdale, Pa.
L. De Rome Bronze Foundry, San Francisco, Calif.
Lebanon Steel Foundry, Lebanon, Pa.
Leitelt Bros., Chicago, Ill.
Levering Bros., Baltimore, Md.
Llewelyn Iron Works, Los Angeles, Calif.
Locomotive Superheater Co., New York, N. Y.
Los Angeles Shipbuilding & Dry Dock Co., San Pedro, Calif.
Los Angeles Valve & Fittings Co., Los Angeles, Calif.
Long Island Machine & Marine Construction Co., Long Island City, N. Y.
Louisiana Brass Works, New Orleans, La.
Lucey Manufacturing Corporation of Texas, Houston, Tex.
L. U. Millward Co., Buffalo, N. Y.
Lytton Manufacturing Co., Franklin, Va.
Mabry-Green Foundry & Machinery Co., Beaumont, Tex.
Macaulay Foundry Co., San Francisco, Calif.
Machinery Division, Navy Yard, New York, N. Y.
Madsen Iron Works, Los Angeles, Calif.
Magnus Co. (Inc.), Los Angeles, Calif.
Mahoning Foundry & Machine Co., Punxsutawney, Pa.
Main Street Iron Works, San Francisco, Calif.
Malcolm Foundry Co. (Inc.), Newark, N. J.
Malleable Iron Fittings Co., Branford, Conn.
Manistee Iron Works, Manistee, Mich.
Manitowoc Shipbuilding & Dry Dock Co., Manitowoc, Wis.
Marietta Manufacturing Co., Marietta, Ohio.
Marietta Manufacturing Co., Point Pleasant, W. Va.
Marine Equipment Co., Detroit, Mich.
Marine Equipment Co., Mobile, Ala.
Marine Iron Works, Chicago, Ill.
Marine Manufacturing & Supply Co., Pittsburgh, Pa.
Marine Railway Machine & Boiler Works, Baltimore, Md.
Mark Manufacturing Co., Evanston, Ill.
Maryland Steel Co., Sparrows Point, Md.
Mason Machine Works, Taunton, Mass.
Mason Regulator Co., Boston, Mass.
Materne Manufacturing Co., St. Louis, Mo.
Maynard Electric Steel Casting Co., Milwaukee, Wis.
McCormick Bros. Iron Works, San Francisco, Calif.
McDonough Iron Works, Galveston, Tex.
McDougall-Duluth Co., Duluth, Minn.
McDowell Foundry Co., Chicago Heights, Ill.
McKay, Moore & Noble, San Francisco, Calif.
Merchant Shipbuilding Corporation, Chester, Pa.
Merchants & Miners Transportation Co., Baltimore, Md.
Merco Nordstrom Valve Co., New York, N. Y.
Merrill-Stevens Co., Jacksonville, Fla.
Metcalf Iron Works, Brooklyn, N. Y.
M. Greenberg's Sons, San Francisco, Calif.
M. H. Aterite Co. (Inc.), New York, N. Y.
Michigan Steel Casting Co., Detroit, Mich.
Midland Iron & Steel Co., Midland, Ontario, Canada.
Midwest Engine Co., Indianapolis, Ind.
Milwaukee Valve Co., Milwaukee, Wis.
Mitchell Co. (John McAinsh, Prop.), New York, N. Y.
Mobile Pulley & Machine Works, Mobile, Ala.
Montague Iron Works, Chicago, Ill.
Moore & Scott Iron Works, San Francisco, Calif.
Morgan Engineering Co., Jersey City, N. J.
Morgan's Louisiana & Texas Railroad & Steamship Co., Algiers, La.
Mueller Metals Co., Port Huron, Mich.
Murray Iron Works, Burlington, Iowa.
Nathan Manufacturing Co., New York, N. Y.
Nathan Manufacturing Co., Parkersburg, W. Va.
National Brake & Electric Co., Milwaukee, Wis.
National Foundry Co., Erie, Pa.
National Refrigeration Corporation, Beloit, Wis.
National Shipbuilding Co. of Texas, Orange, Tex.
National Tube Co., Kewanee Works, Kewanee, Ill.
Navy Yard, Philadelphia, Pa.
Navy Yard, Portsmouth, N. H.
Nazareth Foundry & Machine Co., Nazareth, Pa.
Neckar Water Softener Corporation, New York, N. Y.
Nelson Iron Works, Marshfield, Oreg.
Newburgh Steam Boiler Works, Newburgh, N. Y.
Newburgh Steam Boiler Works, St. Louis, Mo.
New England Navigation Co., Newport, R. I.
New Jersey Valve & Fitting Co. (Inc.), Hawthorne, N. J.
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.
New York Brass Foundry Co., New York, N. Y.
New York Engineering Co., New York, N. Y.
New York Harbor Dry Dock Corporation, Rosebank, Staten Island, N. Y.
New York Repair & Supply Co., New York, N. Y.
Nordberg Manufacturing Co., Milwaukee, Wis.
Northern Equipment Co., Erie, Pa.
Northwest Bridge & Iron Co., Portland, Oreg.
Northwest Engineering Works, Green Bay, Wis.
Northwestern Steel & Iron Corporation, Minneapolis, Minn.
Ocean Engine & Boiler Works (Inc.), Brooklyn, N. Y.
Oil City Brass Works, Beaumont, Tex.
Old Dominion Iron Works, Berkley, Va.
Old Dominion Iron Works, Norfolk, Va.
Olympic Foundry Co., Seattle, Wash.
Olympic Steel Works, Seattle, Wash.
O'Neil Iron Works, Buffalo, N. Y.
Oregon Brass Works, Portland, Oreg.
Oregon-Washington Railroad & Navigation Co., Portland, Oreg.
Pacific American Fisheries, South Bellingham, Wash.
Pacific Brass & Bronze Foundry, San Francisco, Calif.
Pacific Coast Engineering Co., Seattle, Wash.
Pacific Coast Shipbuilding Co., Bay Point, Calif.
Pacific Foundry Co., San Francisco, Calif.
Pacific Marine Iron Works, Portland, Oreg.
Pacific Metal Works, San Francisco, Calif.
Paterson Brass Manufacturing Co., Paterson, N. J.
Patrick White & Sons, Perth Amboy, N. J.
P. David Co., San Francisco, Calif.
Peerless Foundry Co., Pittsburgh, Pa.
Penberthy Injector Co., Detroit, Mich.
Peninsula Shipbuilding Co., Portland, Oreg.
Peninsular Steel Castings Co., Detroit, Mich.
Penn Steel Casting & Machine Co., Chester, Pa.
Pennsylvania Boiler Works, Erie, Pa.
Pennsylvania Forge Co., Bridesburg, Pa.
Pennsylvania Railroad Co. shops, Hoboken, N. J.
Pennsylvania Railroad Co. shops, Altoona, Pa.
Percy S. Capstaff, Woodridge, N. J.
Perth Amboy Dry Dock Co., Perth Amboy, N. J.
Philadelphia Coppersmithing Co., Philadelphia, Pa.
Philadelphia Electric Steel Corporation, Conshohocken, Pa.
Philadelphia Malleable Iron Works, Philadelphia, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.
Philadelphia Steel & Iron Co., Philadelphia, Pa.
P. H. O'Day & Son, New York, N. Y.
Phoenix Foundry & Machine Co., Ashtabula, Ohio.
Phoenix Iron Works, Portland, Oreg.
Phoenix Iron Works Co., Oakland, Calif.
Phoenix Machine Works, Mobile, Ala.
Pierce, Butler & Pierce Manufacturing Corporation, New York, N. Y.
Pier Machine Works, Brooklyn, N. Y.
Pittsburgh Piping & Equipment Corporation, Pittsburgh, Pa.
Pittsburgh Valve & Fittings Co., Barberton, Ohio.
Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, Pa.

Point Pleasant Machine Works, Point Pleasant, W. Va.
Portland Bronze & Crucible Steel Foundry, Portland, Oreg.
Pratt & Cady Co., Hartford, Conn.
Providence Engineering Corporation, New York, N. Y.
Puget Sound Machinery Depot, Seattle, Wash.
Queen City Brass & Iron Works, Cincinnati, Ohio.
Quincy Steel Casting Co., Quincy, Mass.
Racine Steel Castings Co., Racine, Wis.
Reading-Bayonne Steel Casting Co., Bayonne, N. J.
Reading Steel Casting Co., New York, N. Y.
Reading Steel Casting Co., Hartford, Conn.
Reading Steel Casting Co., Reading, Pa.
Reading Valve & Fittings Co., Reading, Pa.
Redington Standard Fittings Co., Redington, Pa.
Reliance Steel Casting Co., Pittsburgh, Pa.
Restucci Steam Valve Corporation, New York, N. Y.
Riehl-Johnston Manufacturing Co. (Inc.), Pittsburgh, Pa.
Riverside Steel Casting Co., Newark, N. J.
R. J. Schwab & Sons Co., Milwaukee, Wis.
Roberts Brass Co., Milwaukee, Wis.
Robert Wetherill & Co. (Inc.), Chester, Pa.
Robins Dry Dock & Repair Co., Brooklyn, N. Y.
Rosedale Foundry & Machinery Co., Pittsburgh, Pa.
Ross-Meehan Foundry Co., Chattanooga, Tenn.
Rowe & Davis Engineers (Inc.), New York, N. Y.
Roxbury Steel Castings Co., Boston, Mass.
Rundle Spence Manufacturing Co., Milwaukee, Wis.
Ruppel Machine & Manufacturing Co. (Inc.), New Orleans, La.
Saginaw Shipbuilding Co., Saginaw, Mich.
San Francisco Brass Foundry, San Francisco, Calif.
San Francisco-Oakland Terminal Railway Co., San Francisco, Calif.
Sarco Co., New York, N. Y.
Schantz & Eckert, Perth Amboy, N. J.
Schiller-Nolan Co., Philadelphia, Pa.
Schoellhorn-Albrecht Machine Co., St. Louis, Mo.
Schutte & Koerting Co., Philadelphia, Pa.
Scott Valve Manufacturing Co., Detroit, Mich.
Scranton Electric Steel Co., Scranton, Pa.
Scullin-Gallagher Iron & Steel Co., St. Louis, Mo.
Seaboard Machine Works, Seattle, Wash.
Seattle Brass Co., Seattle, Wash.
Seattle Construction & Dry Dock Co., Seattle, Wash.
Seattle Machine Works, Seattle, Wash.
S. Flory Manufacturing Co., Bangor, Pa.
Sheboygan Machine Co., Sheboygan, Wis.
Shelton Bros., Paducah, Ky.
Sheriffs Manufacturing Co., Milwaukee, Wis.
Simon Scullin, Philadelphia, Pa.
Sivyer Steel Casting Co., Milwaukee, Wis.
Skagit Steel & Iron Works, Sedro-Wolley, Wash.
Skinner Shipbuilding & Dry Dock Co., Baltimore, Md.
Smith & Watson Iron Works, Portland, Oreg.
Southern Boiler Scaling Co. (Inc.), New Orleans, La.
Southern Pacific Co., Sacramento, Calif.
South Florida Foundry & Machine Works, Orlando, Fla.
Southwestern Shipbuilding Co., East San Pedro, Calif.
Spedden Shipbuilding Co., Baltimore, Md.
Spence, Smith & Kootz Co., Parkersburg, W. Va.
Spencer Heater Co., Scranton, Pa.
Standard Brass Casting Co., Oakland, Calif.
Standard Bronze Co., Seattle, Wash.
Standard Oil Co. of New York (Marine Dept.), Long Island City, N. Y.
Standard Process Steel Corporation, Phillipsburg, N. J.
Standard Shipbuilding Corporation, Mariners Harbor, Richmond Borough, N. Y.
Standard Union Co., New York, N. Y.
Standifer Construction Corporation, Portland, Oreg.
Stanley G. Flagg & Co., Philadelphia, Pa.
Star Brass Manufacturing Co., Boston, Mass.
Star Brass Works, Seattle, Wash.
Steiger & Kerr Stove & Foundry Co., San Francisco, Calif.
Stern Foundry & Machinery Co., New Orleans, La.
Stevens & Normand, New York, N. Y.
St. Louis Iron & Machine Works, St. Louis, Mo.
St. Louis Steel Foundry Co., St. Louis, Mo.
Stockham Pipe & Fittings Co., Birmingham, Ala.
Strong Steel Foundry Co., Buffalo, N. Y.
Sumner Iron Works, Everett, Wash.
Talbot Boiler Co., New York, N. Y.
Tampa Shipbuilding & Engineering Co., Tampa, Fla.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Taylor-Wilson Manufacturing Co., McKees Rocks, Pa.
Tebo Yacht Basin Co., Brooklyn, N. Y.
Techno Service Corporation, New York, N. Y.
Tennessee Coal, Iron & Railroad Co., Ensley, Ala.
Texas Brass Manufacturing Co., Houston, Tex.
Thayer-Shaver-Gulley Machine Co., Portland, Oreg.
The Acme Machine Co., Galveston, Tex.
The American Foundry & Manufacturing Co., Frederick, Md.
The Ashton Valve Co., Boston, Mass.
The Atlantic Works, East Boston, Mass.
The Atlas Steel Casting Co., Buffalo, N. Y.
The Babcock & Wilcox Co., Bayonne, N. J.
The Baltimore Drydock & Shipbuilding Co., Baltimore, Md.
The Barber Manufacturing Co., Ashtabula, Ohio.
The Bashlin Co., Warren, Pa.
The Bayer Co., St. Louis, Mo.
The Boston Engineering Co. (Inc.), Boston, Mass.
The Bowler Foundry Co., Cleveland, Ohio.
The Brylgon Steel Casting Co., New Castle, Del.
The Campbell's Creek Coal Co. (Marine Dept.), Dana, W. Va.
The Central Forging Co., Catawissa, Pa.
The C. E. Squires Co., Cleveland, Ohio.
The Chapman Valve Manufacturing Co., Indian Orchard, Mass.
The Charles Barnes Co., Cincinnati, Ohio.
The Charles Ward Engineering Works, Charleston, W. Va.
The Cincinnati Steel Casting Co., Cincinnati, Ohio.
The Commercial Steel Castings Co., Marion, Ohio.
The Consolidated Ashcroft Hancock Co. (Inc.), New York, N. Y., and Chicago, Ill.
The Consolidated Safety Valve Co., Bridgeport, Conn.
The Crown Smelting Co., Chester, Pa.
The Dayton Steel Foundry Co., Dayton, Ohio.
The Diez & Roemers Brass Co., Baltimore, Md.
The Dravo Contracting Co., Pittsburgh, Pa.
The D. T. Williams Valve Co., Cincinnati, Ohio.
The Eckenroth Valve & Manufacturing Co., Philadelphia, Pa.
The Edna Brass Manufacturing Co., Cincinnati, Ohio.
The Edward Valve & Manufacturing Co., Chicago, Ill.
The Electric Steel Foundry Co., Portland, Oreg.
The Ellicott Machine Corporation, Baltimore, Md.
The Fairbanks Co., Binghamton, N. Y.
The Fairbanks Co., New York, N. Y.
The Falk Co., Milwaukee, Wis.
The Ferrochem Co. (Ltd.), New York, N. Y.
The Filer & Stowell Co., Milwaukee, Wis.
The Fisher Governor Co. (Inc.), Marshalltown, Iowa.
The Flour Ornamental Iron Co., Minneapolis, Minn.
The Frederick Iron & Steel Co., Frederick, Md.
The Frisbie Engine & Machine Works, Cincinnati, Ohio.
The Gardner Governor Co., Quincy, Ill.
The Gauld Co., Portland, Oreg.
The Gibson & Kirk Co., Baltimore, Md.
The Griscom-Russell Co., New York, N. Y.
The Hancock Inspirator Co., Boston, Mass.
The Hayden & Derby Manufacturing Co., New York, N. Y.
The Hooven Owens Rentschler Co., Hamilton, Ohio.
The Hope Forge & Machine Co., Mount Vernon, Ohio.
The Huxley Bronze Casting Co., Philadelphia, Pa.

The Iowa Machine Works, Clinton, Ohio.
The James F. Powers Foundry Co., Elkton, Md.
The Johnson Iron Works (Ltd.), New Orleans, La.
The Kappler Fox Foundry Co., Philadelphia, Pa.
The Kelly & Jones Co., Greensburg, Pa.
The Kennedy Valve Manufacturing Co., Elmira, N. Y.
The Leslie Co., Lyndhurst, N. J.
The Lima Steel Castings Co., Lima, Ohio.
The Lorain Castings Co., Lorain, Ohio.
The Ludlow Valve Manufacturing Co., Troy, N. Y.
The Lunkenheimer Co., Cincinnati, Ohio.
The Maryland Dry Dock Co., Baltimore, Md.[3]
The McAlear Manufacturing Co., Chicago, Ill.
The McNab & Harlin Manufacturing Co., New York, N. Y.
The McNab Co., Bridgeport, Conn.
The Merrill Co., San Francisco, Calif.
The Morgan Engineering Co., Alliance, Ohio.
The M. Smolensky Manufacturing Co., Cleveland, Ohio.
The New Jersey Steel Co., Rahway, N. J.
The Oakadee Co., Chicago, Ill.
The Ohio Blower Co., Cleveland, Ohio.
The Ohio Brass Co., Mansfield, Ohio.
The Ohio Injector Co., Wadsworth, Ohio.
The Oscar Krenz Copper & Brass Works, San Francisco, Calif.
The Pittsburgh Foundry Co., Los Angeles, Calif.
The Plains Iron Works, Denver, Colo.
The Prescott Co., Menominee, Mich.
The Prime Steel Co., Milwaukee, Wis.
The Prime Steel Co., San Francisco, Calif.
The Portland Co., Portland, Me.
The Puget Sound Iron & Steel Works, Tacoma, Wash.
The Pusey & Jones Co., Wilmington, Del.
The Richards Iron Works, Manitowoc, Wis.
The Richardson-Phenix Co., Milwaukee, Wis.
The Riverside Steel Casting Co., Newark, N. J.
The Rowland Valve Co. (Inc.), Seattle, Wash.
The Shaw-Kendall Engineering Co., Toledo, Ohio.
The Skinner & Arnold Co., Albany, N. Y.
The Smolensky Valve Co., Cleveland, Ohio.
The Standard Machine Co., Mystic, Conn.
The Strong, Carlisle & Hammond Co., Cleveland, Ohio.
The Swartwout Co., Cleveland, Ohio.
The Tennent Steel Corporation, Tacoma, Wash.
The Titusville Iron Co., Titusville, Pa.
The Toledo Steel Casting Co., Toledo, Ohio.
The V. D. Anderson Co., Cleveland, Ohio.
The William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.
The Wm. Powell Co., Cincinnati, Ohio.
Theo. Smith & Sons Co., Jersey City, N. J.
Thomas Devlin Manufacturing Co., Philadelphia, Pa.
Thomas W. Hooley Metal Works Co., New Orleans, La.
Thompson Bros., San Francisco, Calif.
Thorne Pioneer Co. (Inc.), Brooklyn, N. Y.
Tioga Steel & Iron Co., Philadelphia, Pa.
Todd Dry Dock Engineering & Repair Corporation, New York, N. Y.[4]
Todd Dry Dock & Construction Corporation, Tacoma, Wash.
Todd Engineering Dry Dock & Repair Co. (Inc,.) New Orleans, La.
Todd Shipbuilding & Dry Dock Co. (Inc.), Mobile, Ala.
Toledo Shipbuilding Co., Toledo, Ohio.
Torrey Roller Bushing Works, Bath, Me.
Treadwell Engineering Co., Easton, Pa.
Trill Indicator Co., Corry, Pa.
Tri-State Foundry & Machine Co., Pittsburgh, Pa.
Tucker Machine Works, Hoboken, N. J.
Union Construction Co., Oakland, Calif.
Union Gas Engine Co., Oakland, Calif.
Union Iron Works, San Francisco, Calif.
Union Machine Co., San Francisco, Calif.
Union Machine Works & Iron Foundry, Philadelphia, Pa.
Union Oil Co. of California, Wilmington, Calif.
Union Shipbuilding Co., Baltimore, Md.
Union Steel Casting Co., Boston, Mass.
Union Tool Co., Torrance, Calif.
Union Water Meter Co., Worcester, Mass.
United Brass Manufacturing Co., Cleveland, Ohio.
United Dry Docks (Inc.), New York, N. Y.[5]
United Dry Docks (Inc.), New York, N. Y., for their Crane, Fletcher, Morse, Alderton, Shewan, and Staten Island plants.
United Engineering Works, San Francisco, Calif.
United States Cast-Iron Pipe & Foundry Co., Columbus, Ohio.
Valley Iron Works Co., Appleton, Wis.
Vanadium Metals Co., Groton, Conn.
Variety Iron Works, Seattle, Wash.
Verdon & Co., New York, N. Y.
Virginia Shipbuilding Corporation, Alexandria, Va.
Vulcan Iron Works, Jersey City, N. J.
Vulcan Manufacturing Co., Seattle, Wash.
Walworth Manufacturing Co., Boston, Mass.
Warman Steel Casting Co., Los Angeles, Calif.
Washington Iron Works, Seattle, Wash.
Waters Governor Co., Boston, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Waynesboro Metal & Foundry Co., Waynesboro, Pa.
Western Foundry, San Francisco, Calif.
Westinghouse Electric & Manufacturing Co., Philadelphia, Pa.
Westinghouse Machine Co., East Pittsburgh, Pa.
White Fuel Oil Engineering Corporation, New York, N. Y.
Willamette & Columbia River Machine Shop, Portland, Oreg.
Willamette Iron & Steel Works, Portland, Oreg.
William E. Williams, New York, N. Y.
Williams Adams Foundry Co., Philadelphia, Pa.
Wilson & Hausler, Montague, Mich.
Wm. C. Ellis & Sons Iron Works, Memphis, Tenn.
Wm. Wharton, jr., & Co., Easton, Pa.
Wright-Austin Co., Detroit, Mich.
W. S. Cahill Co., Baltimore, Md.
W. T. Garrett & Co., San Francisco, Calif.
Wymo Engineering Co., Brooklyn, N. Y.
Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa.
York Manufacturing Co., York, Pa.
Zandt Brass Foundry Co., Seattle, Wash.

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[3] This company has taken over the Globe Shipbuilding & Dry Dock Co.

[4] Formerly Todd Shipyards Corporation (Quintard plant).

[5] Formerly W. & A. Fletcher Co., Morse Dry Dock & Repair Co., and Staten Island Shipbuilding Co.

MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF SAFETY VALVES.

Ashton Valve Co., New York, N. Y.
Coale Muffler & Safety Valve Co., Baltimore, Md.
Consolidated Ashcroft Hancock Co. (Inc.), Bridgeport, Conn.
Crane Co., Chicago, Ill.
Crosby Steam Gage & Valve Co., Boston, Mass.
J. E. Lonergan Co., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, Ohio.
Scott Safety Valve Manufacturing Co., Detroit, Mich.
Star Brass Manufacturing Co., Boston, Mass.

MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF FUSIBLE PLUGS.

A. F. Mitchell & Son, Chicago, Ill.
A. Harvey's Sons Manufacturing Co., Detroit, Mich.
American Injector Co., Detroit, Mich.
American Lamp & Mine Supply Co., Scranton, Pa.
American Machine & Engineering Corporation, Pittsburgh, Pa.
American Shipbuilding Co., Cleveland, Ohio.
Anchor Brass Works, San Francisco, Calif.
A. Nicholson, Albany, N. Y.
Babcock & Wilcox Co., Barberton, Ohio.
Bath Iron Works (Ltd.), Bath, Me.
Bertelsen & Petersen Engineering Co., Boston, Mass.
Bethlehem Shipbuilding Corporation (Ltd.), San Francisco, Calif.
B. Hoffman Manufacturing Co., Milwaukee, Wis.
Boston Engineering Co., Boston, Mass.
Boston Steam Specialty Co., Boston, Mass.
Buckeye Iron & Brass Co., Dayton, Ohio.
Charles Hegewald Co., New Albany, Ind.
C. H. McCutcheon, Buffalo, N. Y.
Cornell Steamboat Co., Rondout, N. Y.
Crane Co., Bridgeport, Conn.
Deck Bros., Buffalo, N. Y.
Detroit Lubricator Co., Detroit, Mich.
Detroit Shipbuilding Co., Detroit, Mich.
Downey Heating & Supply Co., Milwaukee, Wis.
Dunham Towing & Wrecking Co., South Chicago, Ill.
Eastern Steamship Lines (Inc.), Boston, Mass.
Elisha Webb & Son Co., Philadelphia, Pa.
Erie Railroad Co. (Marine Dept.), Jersey City, N.J.
F. G. Dyer Brass & Machine Works, San Francisco, Calif.
F. H. Koretke Brass & Manufacturing Co., New Orleans, La.
Fries & Co., Buffalo, N. Y.
Garrott Brass & Machine Co., Houston, Tex.
General Fire Extinguisher Co., Providence, R. I.
Gile Tractor & Engine Co., Ludington, Mich.
Gillett, Eaton & Squire, Lake City, Minn.
Glasgow Iron Works & Supply Co., New York, N. Y.
Great Lakes Engineering Works, Detroit, Mich.
H. A. Blake & Son, Cheboygan, Mich.
Hampden Brass Co., Springfield, Mass.
Harper's Brass Works, Portland, Oreg.
H. B. Sherman Manufacturing Co., Battle Creek, Mich.
Hills McCanna Co., Chicago, Ill.
Hoffman & Billings Manufacturing Co., Milwaukee, Wis.
Inter-Island Steam Navigation Co. (Ltd.), Honolulu, Hawaii.
Iowa Machine Works, Clinton, Iowa.
I. Shonberg (Inc.), Brooklyn, N. Y.
James Jones Co., Los Angeles, Calif.
Jerguson Iron Works, Key West, Fla.
J. J. Pickley, Mobile, Ala.
John A. Rohan Boiler Works, St. Louis, Mo.
John Baizley Iron Works, Philadelphia, Pa.
John H. Murphy Iron Works, New Orleans, La.
Johnson Iron Works, New Orleans, La.
Kelly & Jones Co., Greensburg, Pa.
Keystone Brass Co., Erie, Pa.
Kingsford Foundry & Machine Co., Oswego, N. Y.
Kupferle Bros. Manufacturing Co., St. Louis, Mo.
L. Katzenstein & Co., New York, N. Y.
McKinnon Iron Works Co., Ashtabula, Ohio.
McNab & Harlin Manufacturing Co., Paterson, N. J.
Manistee Iron Works, Manistee, Mich.
Marine Engineering Co., Boston, Mass.
Marine Iron & Shipbuilding Works, Duluth, Minn.
Marine Manufacturing & Supply Co., Pittsburgh, Pa.
Maryland Steel Co., Sparrows Point, Md.
Mason Engineering Works (Inc.), New York, N.Y.
Merrill-Stevens Co., Jacksonville, Fla.
M. Greenberg's Sons, San Francisco, Calif.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Monongahela River Consolidated Coal & Coke Co., Pittsburgh, Pa.
Moran Flexible Steam Joint Co., Louisville, Ky.
Morgan's Louisiana & Texas Railroad & Steamship Co., Algiers, La.
Morton Co., San Francisco, Calif.
New Bedford Boiler & Machine Co., New Bedford, Mass.
New Jersey Valve & Fitting Co. (Inc.), Hawthorne, N. J.
New York Shipbuilding Co., Camden, N. J.
Ohio Injector Co., Wadsworth, Ohio.
Oil City Brass Works, Beaumont, Tex.
Oregon Brass Works, Portland, Oreg.
Pacific American Fisheries, South Bellingham, Wash.
Pennsylvania Railroad Co., Hoboken, N. J.
P. H. O'Day & Son, New York, N. Y.
Pittsburgh Coal Co., Pittsburgh, Pa.
Point Pleasant Machine Works, Point Pleasant, W. Va.
Riehl Manufacturing Co. (Inc.), Pittsburgh, Pa.
Riverside Iron Works, Charleston, S. C.
Rodgers Sand Co., Pittsburgh, Pa.
Rundle-Spence Manufacturing Co., Milwaukee, Wis.
Seattle Brass Co., Seattle, Wash.
Sherwood Manufacturing Co., Buffalo, N. Y.
Skinner & Arnold Co., Albany, N. Y.
Southern Brass Manufacturing and Plating Co., Houston, Tex.
Southern Pacific Co., New York, N. Y.
Spence, Smith & Kootz Co., Parkersburg, W. Va.
Spencer Regulator Co., Salem, Mass.
Star Brass Works, Seattle, Wash.
Staten Island Shipbuilding Co., Port Richmond, N. Y.
Stern Foundry & Machinery Co., New Orleans, La.
Sucesores De Abarca, San Juan, P. R.
Tampa Shipbuilding & Engineering Co., Tampa, Fla.
Texas Brass Manufacturing Co., Houston, Tex.
The Ashcroft Manufacturing Co., Bridgeport, Conn.
The Atlantic Works (Inc.), East Boston, Mass.
The Campbell Creek Coal Co., Point Pleasant, W. Va.
The Carnegie Steel Co., Clairton, Pa.
The Chaplin-Fulton Manufacturing Co., Pittsburgh, Pa.
The Charles Barnes Co., Cincinnati, Ohio.
The Coale Muffler & Safety Valve Co., Baltimore, Md.
The Diez & Roemer Brass Co., Baltimore, Md.
The Edro Richardson Brass Co., Baltimore, Md.
The E. W. Vanduzen Co., Cincinnati, Ohio.
The Farnan Brass Works Co., Cleveland, Ohio.
The Griscom-Russell Co., New York, N. Y.
The Hancock Inspirator Co., Boston, Mass.
The Lunkenheimer Co., Cincinnati, Ohio.
The New England Steamship Co., Newport, R. I.
The Portland Co., Portland, Me.
The Richards Iron Works, Manitowoc, Wis.
The Toledo Shipbuilding Co., Toledo, Ohio.
The Wiggins Ferry Co., St. Louis, Mo.
Thomas B. Banner, Chicago, Ill.
T. Murphy Iron Works, Jacksonville, Fla.
Tranter Manufacturing Co., Pittsburgh, Pa.
Union Iron Works Co., San Francisco, Calif.
United States Engineers Office, War Dept., St. Louis, Mo.
United States Lighthouse Service, Detroit, Mich.
Valk & Murdock Co., Charleston, S. C.
Vulcan Iron Works, Cairo, Ill.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
Walworth Manufacturing Co., Boston, Mass.
William J. Kennedy Co., New York, N. Y.
William Powell Co., Cincinnati, Ohio.
W. P. Phillips, Boston, Mass.
W. S. Cahill Co., Baltimore, Md.
W. T. Garrett & Co., San Francisco, Calif.

MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF BOILER TUBES.

Allegheny Steel Co., Breckenridge, Pa.
Babcock & Wilcox Co., Beaver Falls, Pa.
Bethlehem Steel Co., Philadelphia, Pa.
Casey-Hedges Co., Chattanooga, Tenn.
Central Alloy Steel Corporation, Massillon, Ohio.
Chase Metal Works, Waterbury, Conn.
D. Connelly Boiler Co., Cleveland, Ohio.
Delaware Seamless Tube Co., Auburn, Pa.
Detroit Seamless Steel Tube Co., Detroit, Mich.
Emergency Fleet Corporation, Washington, D. C.
Globe Seamless Steel Tubes Co., Milwaukee, Wis.
Heine Safety Boiler Co., Phoenixville, Pa.
Monessen Foundry & Machinery Co., Monessen, Pa.
Monongahela Tube Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Navy Yard, Boston, Mass.
Pittsburgh Seamless Tube Co., Morado, Pa.
Pittsburgh Steel Products Co., Pittsburgh, Pa.
Power Specialty Co., New York, N. Y.
Reading Iron Co., Reading, Pa.
Spang, Chalfant & Co. (Inc.), Pittsburgh, Pa.
Standard Seamless Tube Co., Allentown, Pa.
Superheater Co., New York, N. Y.
The American Brass Co., Waterbury, Conn.
The Ohio Seamless Tube Co., Shelby, Ohio.
The Parkesburg Iron Co., Parkesburg, Pa.
The Tyler Tube & Pipe Co., Washington, Pa.
Traylor Engineering & Manufacturing Co., Allentown, Pa.

MANUFACTURERS WHO HAVE FILED AFFIDAVITS IN THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL COVERING THE MANUFACTURE OF STEAM AND WATER PIPES.

A. M. Byers Co., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., Beaver Falls, Pa.
Ballwood Co., New York, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Central Tube Co., Pittsburgh, Pa.
Chase Metal Works, Waterbury, Conn.
Clayton Mark & Co., Chicago, Ill.
Cohoes Rolling Mill Co., Cohoes, N. Y.
Delaware Seamless Tube Co., Auburn, Pa.
Flower-Stephens Manufacturing Co., Detroit, Mich.
Ford Bros. & Co., Philadelphia, Pa.
General Pipe & Foundry Co., Atlanta, Ga.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Kerr Machinery Corporation, Detroit, Mich.
Marine Equipment Co., Detroit, Mich.
Mark Manufacturing Co., Chicago, Ill.
Mobile Pulley & Machine Works, Mobile, Ala.
Monessen Foundry & Machine Co., Monessen, Pa.
National Tube Co., Pittsburgh, Pa.
Northern Equipment Co., Erie, Pa.
Pittsburgh Steel Products Co., Pittsburgh, Pa.
Reading Iron Co., Reading, Pa.
Republic Iron & Steel Co., Youngstown, Ohio.
South Chester Tube Co., Chester, Pa.
Spang, Chalfant & Co. (Inc.), Pittsburgh, Pa.
United States Cast Steel & Foundry Co., Columbus, Ohio.
Victory Manufacturing Co., Niles, Calif.
Wheeling Steel Corporation, Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

RULINGS GIVEN BY THE OFFICE OF THE SUPERVISING INSPECTOR GENERAL IN CONNECTION WITH THE HANDLING OF SO-CALLED DANGEROUS ARTICLES UNDER THE PROVISIONS OF SECTION 4472, REVISED STATUTES.

Acco roach and water bug exterminator may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, November, 1917.)

Acetalehyde shall not be transported on steamers carrying passengers. (Ruling, October, 1925.)

Acetic acid may be transported on steamers carrying passengers, when properly packed in quantities up to 10 pints, and in the same case with other chemicals when carefully packed and cushioned and inclosed in bottles containing not over 1 pint and not more than five bottles in one case. When transported in bulk on steamers carrying passengers it may be contained in drums or carboys and must be carried on deck of such vessels. (Ruling, November, 1918.)

Acetic anhydride may be transported on deck on steamers carrying passengers. (Ruling, November, 1915.)

Acetic ether shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1918.)

Acetone, according to a decision of the solicitor of the department, is not prohibited by section 4472, Revised Statutes, from being transported on steamers carrying passengers. (Ruling, January, 1915.)

Acetone oil, *light*, not only flashes but burns at room temperature and is clearly dangerous and, therefore, shall not be carried on steamers carrying passengers. (Ruling, July, 1914.)

Acetone oil, *heavy*, which will not ignite at a temperature less than 110° F., may be carried on steamers carrying passengers upon routes where there is no other practicable mode of transporting it, under the same conditions as refined petroleum. (Ruling, July, 1914.)

Acetyl chloride may be transported on deck on steamers carrying passengers. (Ruling, November, 1915.)

Acetylene may be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the requirements of the Interstate Commerce Commission with regard to the transportation of this commodity. (Ruling, April, 1919.)

Acetylene gas is not permitted to be produced on vessels carrying passengers, and the only way that it may be carried is in properly constructed tanks, which must comply with the requirements of the department. (Ruling, December, 1909.)

Acids not otherwise specified may only be carried on decks or guards of passenger vessels, except if the inspector allows otherwise. (R. S.)

Acid stain, fumed oak, may be transported on steamers carrying passengers without restrictions. (Ruling, May, 1922.)

Activated cocoanut charcoal may be transported on steamers carrying passengers, when shipped in suitably constructed and tightly closed steel drums of a gross weight of about 220 pounds, it being further understood that this commodity shall not be carried in the lower hold. (Ruling, February, 1924.)

Adelite, paint and varnish remover, may be transported on steamers carrying passengers, under the same conditions as varnishes. (Ruling, August, 1926.)

Aerol essence shall not be used as stores on pleasure or passenger steamers, nor shall it be transported on steamers carrying passengers. (Ruling, June, 1922.)

Aerol essence, *diluted*, may be used as stores on pleasure and passenger vessels and may be transported on steamers carrying passengers. (Ruling, June, 1922.)

Aerzonator ceda bloc, manufactured by the United States Sanitary Specialties Corporation, New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1922.)

Afterglow satin-finish polish, manufactured by the Magnesium Products Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1922.)

Alcohol, grain, wood, denatured, and solidified, may be transported on steamers carrying passengers, provided it is not kept in a hot place and is so packed as to prevent any leakage. (Ruling, September, 1919.)

Alfalfa (*see* Hay) may be carried as freight on passenger vessels under the same conditions as hay. (Ruling, January, 1920.)

Allklean auto body polish, manufactured by the Allklean Manufacturing Co., Long Island City, N. Y., may be transported without restriction on vessels carrying passengers. (Ruling, November, 1926.)

Allklean nickel polish, manufactured by the Allklean Manufacturing Co., Long Island City, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1926.)

Almern lamp oil may be used as stores on passenger or pleasure steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Amalie nonburnable metal polish shall not be transported on steamers carrying passengers, or used as stores on passenger or pleasure steamers. (Ruling, November, 1914.)

Amazon roofing cement may be transported on steamers carrying passengers. (Ruling, July, 1916.)

American cream liquid metal polish may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, February, 1915.)

Ammonia, as the fumes are quite dangerous, should be transported in the standard cylinders prescribed by the Interstate Commerce Commission. (70078–11.)

Ammonia anhydrous. *See* Ammonia water.

Ammoniacal liquor is a commodity over which this service has no jurisdiction, but it is suggested that it be transported under conditions that meet the requirements of the Interstate Commerce Commission. (Ruling, November, 1927.)

Ammonia sulphate is permitted to be shipped in barrels and bags on steamers carrying passengers. (53686.)

Ammonia water and ammonia anhydrous are commodities over which this service has no jurisdiction, but it is suggested that they be transported under conditions that meet the requirements of the Interstate Commerce Commission. (76253.)

Ammonium hydrate may be transported in drums on steamers carrying passengers, or else in 4-pound bottles for the purest material. (70078–71.)

Ammonium hydrosulphuret may be transported on passenger steamers under the same conditions as aqua ammonia. (70078–11.)

Ammonium nitrate may be transported on steamers carrying passengers, provided it is specially stowed where it is readily accessible in case of fire. (70078–11.)

Ammunition, small-arms, may be transported without restriction on steamers carrying passengers, and it need not be confined to the magazine of the vessel as heretofore required, with the exception that large-caliber blank black-powder ammunition should be stowed as previously required in the magazine. (Ruling, May, 1911.) "Large caliber" means caliber of .30 or more. (Ruling, July, 1911.) This ruling does not apply to emigrant vessels, which are prohibited from carrying small-arms ammunition. (34135.) The term "Small-arms ammunition" applies to all sizes of cartridges and shells designed for use in small arms, such as rifles, revolvers, pistols, and shotguns, and ammunition of this kind may be transported on steamers carrying passengers without restriction. (Ruling, 1923.)

Amyl acetate (banana oil) may be transported on steamers carrying passengers, provided it is stowed in a cool place and not exposed to heat. (70078–71, 1918.)

Amyl alcohol may be transported on steamers carrying passengers, if in 1-pound containers, care being taken that it is not exposed to high temperature. (70078–71.)

Amyl butyrate, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, July, 1929.)

Amyl formiate, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., shall not be transported on vessels carrying passengers. (Ruling, July, 1929.)

Amyl valerianate, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, July, 1929.)

Amylene shall not be carried on passenger vessels as stores or cargo. (70078–71.)

A–1 liquid metal polish, manufactured by the J. L. Prescott Co., Philadelphia, Pa., shall not be transported on steamers carrying passengers, and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

A No. 1 metal polish, manufactured by Chas. H. Rath & Co., shall not be carried on passenger steamers as stores or cargo. (Ruling, August, 1914.)

A–O–K liquid metal polish, manufactured by Ulrich & Co., Buffalo, N. Y., may be transported on steamers carrying passengers, but shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1929.)

Archibald's no rub metal polish may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger steamers. (Ruling, June, 1919.)

Argon gas is not a dangerous article like those enumerated in section 4472, Revised Statutes, but, as there is a risk incurred in handling and transporting it incident to the bursting of the cylinders, it may be transported in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, September, 1922.)

Army and Navy metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, November, 1917.)

Arrow cleaner polish, manufactured by the Arrow Products Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1924.)

Arsenic may be transported on steamers carrying passengers, provided it is properly packed, and also that it is not placed where there is any possibility of its coming into contact with strong acids. (Ruling, December, 1916.)

Arsenic compounds, such as arsenious acid, sodium arsenate, Fowler's solution, Paris green, Donovan's solution, arsenical insecticides, and lead arsenate, are not ordinarily dangerous for transportation but should be packed securely in tight containers and in such manner as to reduce the chance for breakage to a minimum, when transported on steamers carrying passengers. The case should be labeled distinctly with the name of the article and the word "Poison." In pound packages or less, these articles may be packed with other chemicals or drugs. (Ruling, December, 1916.)

Arsenical insecticides. *See* Arsenic compounds.

Arsenious acid. *See* Arsenic compounds.

Asphalt, standard macadam asphalt binders and standard paving asphalt, may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it. (Ruling, July, 1911.)

Asphalt goudron and liquid asphalt, the tests of which indicate that they are natural asphalt fluxed with petroleum residues and will not ignite at a temperature of less than 110° F., may be carried under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting them. (Ruling, February, 1912.)

Asphalt flux, as submitted by the Standard Oil Co. of New Jersey, may be transported on steamers carrying passengers. (Ruling, April, 1915.)

Asphaltum No. 1 shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Atlacide, a weed and grass killer, manufactured by the Chipman Chemical Engineering Co. (Inc.), Bound Brook, N. J., may be transported on steamers carrying passengers, without restriction. (Ruling, March, 1930.)

Atlas A illuminating oil may be transported on steamers carrying passengers and may be used as stores on such steamers. (Ruling, April, 1916.)

Atlas B illuminating oil may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, April, 1916.)

Aurora marine lamp oil and Aurora special lamp oil may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, April, 1916.)

Automobiles, persons not allowed to smoke, or throw lighted cigars, etc., in space assigned to automobiles on steamers. (Ruling, April, 1913.)

Auto patching cement shall not be transported on steamers carrying passengers. (Ruling, June, 1922.)

Auto top dressing may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1922.)

Avenarious carbolineum. *See* Protexol.

Baco metal polish, manufactured by Bachmeier & Co., New York, N. Y., may be transported on steamers carrying passengers, without restriction. (Ruling, July, 1922.)

Banana oil. *See* Amyl acetate.

B & B insect and bedbug exterminators, manufactured by the B & B Exterminators (Inc.), Baltimore, Md., may be tranported on steamers carrying passengers, but shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1930.)

B. & W. velvet metal paste may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

Barber brand asphalt. *See* Positive sealing priming.

Barber brand liquid asphalt-A. *See* Positive seal priming.

Barber liquid lap cement may be transported on steamers carrying passengers in the usual manner; that is, the can containing the liquid lap cement being inclosed in a roll of roofing paper. (Ruling, April, 1918.)

Barium binoxide may be transported on steamers carrying passengers, providing that it be packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, and with the further provision that it shall not be stored in place containing combustible materials. Furthermore, such drums should be plainly marked showing that the material that is contained therein is inflammable and must be stored in a place where there is no combustible material. (Ruling, October, 1914.)

Barrels and drums, empty. *See* Empty gasoline receptacles.

Barrett Manufacturing Co.'s roofing cement, having a flash point of not less than 239° F. and a fire point of not less than 239° F., may be transported on steamers carrying passengers. (Ruling, November, 1915.)

B-B-Cide, steamship grade, submitted by the Holmes Chemical Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, May, 1921.)

Bedola may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, September, 1920.)

Best of all metal polish, manufactured by the Essex Paint & Chemical Co., Essex, Conn., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, December, 1926.)

Bestovall cream metal polish and Bestovall paste metal polish, manufactured by the Bestovall Co., Stapleton, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1925.)

Bestovall furniture and auto body polish, manufactured by the Bestovall Co., Stapleton, N. Y., may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1925.)

Benzene sulphonyl chloride may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Benzine shall not be carried on passenger vessels as stores or cargo. (R. S.)

Benzoic ether, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, July, 1929.)

Benzole shall not be carried on passenger vessels as stores or cargo. (R. S.)

Besto sweeping compound may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (76683.)

Betanaphthol benzoate may be transported on steamers carrying passengers, if packed in good containers of glass or metal. (Ruling, July, 1918.)

Bichromate of potash (potassium bi- or di-chromate) may be transported on steamers carrying passengers, without restriction, when carried as a deck load and packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 800 pounds. (Ruling, April, 1922.)

Bird & Son (Inc.) roofing cement may be transported on steamers carrying passengers, when carried in absolutely tight containers. (Ruling, December, 1920.)

Bituminous solution. *See* Positive seal priming.

Black Bull liquid cement may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, June, 1922.)

Black Flag liquid spray may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, December, 1927.)

Black oil dye, shoe dye, manufactured by the American Shoe Polish Co., shall not be transported on steamers carrying passengers. (Ruling, November, 1926.)

Black roof paint. *See* Positive seal priming.

Blasting oil. *See* Nitroglycerin.

Blaugas can be carried on steamers carrying passengers, provided it is transported in cylinders that comply in all respects with the regulations prescribed by the Interstate Commerce Commission for the transportation of such articles by rail. (Ruling, May, 1915.)

Bleach. *See* Liquid bleach and caustic bleach.

Bliss exterminator, bedbug liquid, may be carried on steamers carrying passengers but shall not be carried as stores on passenger or pleasure steamers. (76383.)

Bliss vermicide, manufactured by the Bliss Disinfecting Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, October, 1921.)

Blitz lightning antiseptic chemical cleaner, manufactured by the Hazen-Brown Chemical Co., Boston, Mass., may be transported on steamers carrying passengers, and may be used as stores on pleasure or passenger vessels. (Ruling, February, 1928.)

Blue ribbon cream metal polish, manufactured by the International Metal Polish Co., Indianapolis, Ind., which flashes and burns at room temperature (26° C., 79° F.), shall not be transported on steamers carrying passengers, and it shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Blue ribbon metal polish shall not be carried on passenger steamers as stores or cargo. (Ruling, August, 1915.)

Blue ribbon paste metal polish, manufactured by the International Metal Polish Co., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1926.)

Blue Top metal polish, manufactured by the Doyle-Clute Braham Co., Cleveland, Ohio, may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, July, 1929.)

Boiler and stack paint. *See* Positive seal priming.

Borsum's Putz liquid polish may be transported on steamers carrying passengers, when properly packed in metallic cases. "Metallic cases" refer to inner, not outer, packages. (49473.)

Boyce-ite, manufactured by the Boyce & Veeder Co. (Inc.), Long Island City, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1925.)

Brasbrite metal polish shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Bras-Brite polish, noninflammable. *See* Noninflammable bras-brite polish.

Brilliant shine metal polish, manufactured by E. W. Bennett & Co., San Francisco, Calif., which flashes and burns at room temperature (26° C., 79° F.), shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Brilliantshine metal polish, with flash point of 40° F., shall not be carried on passenger steamers as stores or cargo. (Ruling, June, 1912.)

Briquets, made from wood charcoal with starch and water for a binder and which have been stored not less than seven days after drying before loading in car, when packed in bags or barrels, may be transported on steamers carrying passengers. (Ruling, December, 1925.)

Bromine shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1913.)

Bromoform may be transported on steamers carrying passengers, when shipped in absolutely tight containers. (Ruling, November, 1920.)

Bronze powders may be transported on steamers carrying passengers, provided they are packed in hermetically sealed zinc-lined packages, or in packages properly lined with tin plate or terneplate. (Ruling, April, 1915.)

Bronzing liquid varnish No. 3 shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Brown Laboratories metal polish. *See* Metal polish, Brown Laboratories.

Buck brand metal polish shall not be carried on passenger steamers as stores or cargo. (Ruling, December, 1915.)

Burnishine metal polish, marked "inflammable," manufactured by J. C. Paul & Co., Chicago, Ill., which flashes and burns at room temperature (26° C., 79° F.), shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.) Burnishine metal polish, marked "noninflammable," and Burnishine paste nickel polish, manufactured by J. C. Paul & Co., Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1928.)

Bush's Monibak brilliant and Bush's Monibak metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, September, 1915.)

Butyl alcohol may be transported on steamers carrying passengers, provided it is not stowed in a hot place and is so packed as to prevent leakage. (Ruling, August, 1927.)

Butyric ether, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, July, 1929.)

Cadmium nitrate may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Calcium bisulphite may be transported on steamers carrying passengers, when contained in strong water-tight metal receptacles or in strong water-tight barrels, such as wine or whisky barrels, and shall be stowed on deck. (Ruling, January, 1921.)

Calcium carbide may be transported on steamers carrying passengers, when contained in steel drums or steel receptacles, the seams of which are lapped and properly riveted or fastened in such manner as will best insure the maximum strength of the joints, and when the said drums or receptacles shall be water-tight and air-tight during such transportation. For packages of 110 pounds or less, such drums or receptacles shall be made of open-hearth steel of not less than No. 26 gauge. For packages of more than 110 pounds, such drums and receptacles shall be made of not less than No. 24 gauge: *Provided*, That said calcium carbide or carbide of calcium may also be transported on steamers carrying passengers in cans containing not more than 10 pounds of said calcium carbide or carbide of calcium each, such cans to be constructed and packed as follows: Said cans shall be made of 90-pound basis tin or terneplate, shall have double and lapped seams, shall have the openings in the tops fitted with tight compression caps, shall be constructed so as to render them water-tight and air-tight, and shall be packed in substantial wooden cases with not more than 60 pounds total weight of calcium carbide or carbide of calcium in each of such cases. (Rulings, February, 1907, and April, 1919, file 76796.)

Calcium chloride. *See* Lime.

Calcium cyanamide, unhydrated, shall not be carried as stores or cargo on passenger vessels. (Ruling, July, 1912.)

Calcium phosphide may be transported on steamers carrying passengers, in quantities of 1 pound when packed in glass bottles inclosed in tin, but larger quantities in bulk are forbidden. (Ruling, May, 1920.)

Calorene may be transported on steamers carrying passengers, when contained in cylinders that comply in all respects with the requirements of the Interstate Commerce Commission for the transportation of such articles by rail. (Ruling, January, 1921.)

Camphene shall not be carried on passenger vessels as stores or cargo. (R. S.)

Caps, percussion. *See* Percussion caps.

Carbacide may be transported on steamers carrying passengers, under the same conditions as refined petroleum and, if desired, may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Carbohydrogen gas may be transported on steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, July, 1919.)

Carbolacene, a liquid cleanser disinfectant, manufactured by the Carbolacene Co. of America (Inc.), New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1925.)

Carbolic acid or phenol is not limited as to amount permitted as a deck load on steamers carrying passengers, provided it is packed according to the quantity, in iron drums, or in water-tight tin cans which are inclosed in strong wooden cases, but in mixed shipments of drugs or chemicals not more than five 1-pound bottles or the same quantity in water-tight tin cans shall be permitted to be packed in a single case. (Ruling, December, 1919.)

Carbolicol wood preserver may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1922.)

Carbon bisulphide shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1917.)

Carbon black may be transported on steamers carrying passengers, provided it is cool when packed and is packed in tight containers. (Ruling, April, 1924.)

Carbonic-acid gas is not prohibited to be transported on steamers carrying passengers, under section 4472, Revised Statutes. It is suggested, however, that precaution is taken to see that the cylinders containing this article are stowed in a safe, cool place. (Letter, April 26, 1915.)

Carbonic gas, liquid, is a dangerous article to be transported but is not such a like dangerous article as is contemplated in section 4472, Revised Statutes, and, therefore, its carriage as freight and use as stores on steamers carrying passengers is not prohibited by section 4472, Revised Statutes. This commodity may, therefore, be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the regulations of the Interstate Commerce Commission. (Ruling, June, 1923.)

Carbon tetrachloride may be transported and used as stores on steamers carrying passengers. (Ruling, January, 1916.)

Cartridges come under the category of gunpowder and may be carried to continental Europe only on vessels that do not carry immigrants. (Ruling, December, 1909.) *See also* Ammunition, small arms.

Cash register cabinet polish, manufactured by the National Cash Register Co., Dayton, Ohio, may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, January, 1924.)

Caustic soda. Same as concentrated lye and sodium hydroxide. *See* Liquid bleach.

Celluloid. *See* Nitrocellulose products.

Celluloid cement, manufactured by the Celluloid Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, October, 1924.)

Cement paint for roofing paper, manufactured by the Paraffine Co. (Inc.), San Francisco, Calif., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, January, 1928.)

Cement paint, manufactured by the Paraffine Co. (Inc.), San Francisco, Calif., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1920.)

Certain-teed Products Corporation roofing cement may be transported on steamers carrying passengers. (Ruling, August, 1917.)

Charcoal, powdered, may be accepted for transportation in bottles containing 1 pound or less and in lots of not over five bottles in cases with other chemicals, when carefully packed. In separate cases it may be accepted in quantities of less than 25 pounds if securely packed. (40256.)

Charcoal wood, briquets. *See* Briquets.

Chemo insect and germ destroyer, manufactured by the Chemo Co., Buffalo, N. Y., may be transported on steamers carrying passengers, but shall not be used as stores on pleasure or passenger vessels. (Ruling, January, 1927.)

Cherry brighten-up stain may be transported on steamers carrying passengers, under the same conditions as turpentine; that is, that it be packed in good metallic vessels or casks or barrels, well and securely bound with iron, and stowed in a secure part of the vessel and marked with name. (Ruling, May, 1923.)

China wood oil, such as submitted by Arnhold, Karberg & Co., 21–24 State Street, New York, N. Y., is not a dangerous article as contemplated by section 4472, Revised Statutes, and may be transported on steamers carrying passengers. (Ruling, August, 1914.)

Chloracetic acid may be transported on steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, August, 1927.)

Chlorate of potassium. *See* Potassium chlorate.

Chloride, ethyl and methyl. *See* Ethyl chloride and methyl chloride.

Chloride of lime may be transported on steamers carrying passengers. (Ruling, February, 1917.)

Chlorine gas, liquid, shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1918.)

Chlorine gas cylinders, empty, may be transported on steamers carrying passengers, provided that while the cylinders are still on the pier the escape valves are opened wide long enough to let the residual chlorine come to atmospheric pressure, and then closed tightly. (Ruling, December, 1929.)

Chloroform may be transported on steamers carrying passengers. (Ruling, November, 1918.)

Chromic acid may not be accepted for transportation on steamers carrying passengers, except on the decks or guards thereof, or in such other safe part of the vessel as shall be prescribed by the inspectors. (Ruling, January, 1919.)

Citric acid is not inflammable nor seriously corrosive and may be accepted for transportation when properly packed in quantities up to 10 pounds, and in the same case with other chemicals when carefully packed and cushioned and inclosed in bottles not over 1 pound and not more than five bottles in one case. (40256.)

Clenopine may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Clorizol, submitted by the United States Sanitary Specialties Corporation, Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Coal oil shall not be carried on passenger vessels as cargo or stores. (R. S.)

Coal tar, Fuller genuine, may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1927.)

Collodion shall not be carried on passenger vessels as stores or cargo. (40256.)

Colorite, manufactured by Carpenter-Morton Co., Boston, Mass., shall not be transported on steamers carrying passengers. (Ruling, March, 1921.)

Columbia insecticide (powder) may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

Compasses (using gasoline and similar liquids) may be used with safety on steamers carrying passengers. (Ruling, October, 1915.)

Comstock polishing paste may be transported on steamers carrying passengers, without restriction. (Ruling, October, 1921.)

Concentrated lye. Same as caustic soda and sodium hydroxide. *See* Liquid bleach.

Converse mineral paste, silver polish, manufactured by W. W. Converse & Co., Palmer, Mass., may be transported on steamers carrying passengers without restriction and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1925.)

Copper paint shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Copper paint, manufactured by the Baltimore Copper Paint Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1922.)

Corn oil is not a dangerous article within the contemplation of section 4472, Revised Statutes, and may, therefore, be transported on steamers carrying passengers. (Ruling, September, 1914.)

Coroa fibre may be transported on steamers carrying passengers under the same conditions as cotton. (Ruling, September, 1929.)

Coro-noleum may be used as stores on passenger or pleasure steamers. (Ruling, February, 1916.)

Corrosive sublimate. *See* Mercuric chloride.

Co-Speco glass wonder, manufactured by the Consolidated Specialties Co., New Bedford, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1923.)

Cotton, baled, shall be securely bound and covered with bagging on at least three-fourths of its surface, including both ends of the bale. (S. I. S. General Rules and Regulations, April 8, 1918, p. 136.)

Cotton, loose or in poorly compressed and uncovered bales, shall not be carried on passenger vessels as cargo or stores. (R. S.)

Cotton, unginned sea-island, raised in Porto Rico, contained in jute bags and compressed, may lawfully be carried on passenger steamers. (Ruling, June, 1911.)

Cottonseed oil. *See* Residuum of cottonseed oil.

Cotton sweepings may be transported under the same conditions as cotton; that is, in properly covered and compressed bales. (62812.)

Crenoid may be transported on steamers carrying passengers, under the same conditions as turpentine. (Ruling, June, 1916.)

Crelol disinfectant, manufactured by the White Tar Co., New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1925.)

Cremo metal polish may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger steamers. (Ruling, November, 1917.)

Creoline, a disinfectant, may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1927.)

Creolol, a disinfectant, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (December, 1921.)

Creosote may be transported on steamers carrying passengers when in bottles of 1 pound contents or less and in lots of five bottles or less in a single case, with or without other chemicals, when carefully packed. (40256.)

Creosote oil, lumber, piling, telegraph cross-arms, posts, ties, and paving blocks, wholly or partially treated or impregnated with creosote oil, and creosoted stained shingles may be transported on steamers carrying passengers. (Ruling, June, 1921; also, see ruling under Holder.)

Cresol may be permitted as a deck load on steamers carrying passengers, provided it is packed according to quantity in iron drums or in water-tight tin cans which are inclosed in strong wooden cases. (Ruling, April, 1914.)

Cresol, a disinfectant, manufactured by the manufacturing laboratory, Pennsylvania Railroad Co., Altoona, Pa., may, when diluted with water, be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, September, 1929.)

Cyanide may be transported in small quantities on steamers carrying passengers, if packed in sealed tin containers and properly boxed. The cyanide should not be placed with other chemicals in mixed shipments. Large quantities of cyanide may be carried in iron drums on deck. (Ruling, July, 1918.)

Cyanide tank paint shall not be carried on passenger vessels as stores or cargo. (62906.)

Cylinder oil No. 45, high pressure, 600° test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Cylinder stock oil, 545° fire test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Cylinders, empty. *See* Empty gasoline receptacles. *Also see* Empty chlorine-gas cylinders.

Dandee automobile nickel polish, manufactured by the Dandee Manufacturing Co., Cleveland, Ohio, may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Deco bedbug, roach, and ant exterminator, manufactured by the Disinfecting & Exterminating Corporation, New York, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1929.)

De-Germ, an insecticide, manufactured by the Century Chemical Products Co., Detroit, Mich., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Detergine, the fire point of which is 118.4° F., and which is not benzine or gasoline, may be transported on vessels under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it. (Ruling, March, 1916.)

Deth-to-bugs, manufactured by the Nudru Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1923.)

Detonators containing fulminate of mercury shall not be carried on passenger vessels as stores or cargo. (Ruling, July, 1911.)

Devoe lacquer paint may be transported on steamers carrying passengers, under the same conditions as varnishes. (Ruling, February, 1928.)

Dinitrochlorobenzene may be transported on steamers carrying passengers, when packed in tight metal containers. (Ruling, April, 1924.)

Dinitrochlorobenzol may be transported on steamers carrying passengers, when packed in tight metal containers. (Ruling, April, 1924.)

Dinitrophenol shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1917.)

Dinitrotoluol (or mono) may be transported on steamers carrying passengers. (Ruling, May, 1912.)

Disinfectant hypozone may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, April, 1916.)

Disinfectants containing prohibited articles should not be accepted if the flash point is below 110° F. with the closed cup. Such substances flashing above 110° F. may be accepted in bottles of 1 pound or less, carefully packed and inclosed in sealed metallic containers, with not more than 5 pounds in a single container. Not more than 1 pound in a sealed metallic container should be allowed in cases containing other chemicals. (40256.)

Dixie metal polish, Special No. 2, may be used under the provisions of section 5, Rule X, General Rules and Regulations, as stores on any pleasure or passenger steamer. (Ruling, October, 1911.)

Dixie special metal polish shall not be carried on passenger steamers as stores or cargo. (Ruling, August, 1911.)

Dolomite, composed of magnesia and unslaked lime, shall not be carried as stores or cargo on passenger vessels. (Ruling, August, 1915.)

Dominant Met-all Polish, manufactured by the Dominant Products Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, September, 1928.)

Donovan's solution. *See* Arsenic compounds.

D. O. R. Powder deodorizer, manufactured by the D. O. R. Powder Works, Brooklyn, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1925.)

Dorsey metal polishing cloth may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers when care is taken to store it in a cool place. (Ruling, February, 1915.)

Dow monochlorbenzol may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, August, 1928.)

Dragon brand metal polish, manufactured by J. C. Paul Co., Chicago, Ill., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1925.)

Dragon's blood powder, manufactured by R. Mohr & Sons, San Francisco, Calif., may be transported on steamers carrying passengers, without restriction. (Ruling, June, 1926.)

Dross. *See* Lead dross.

Drums, empty. *See* Empty gasoline receptacles.

Duco paints, lacquers, and similar products may be transported on steamers carrying passengers under the same conditions as varnishes. (Ruling, May, 1928.)

Duke's nonburnable metal polish, manufactured by the Jasam Manufacturing Co., Seattle, Wash., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, February, 1914.)

Dutch Brand rubber cement and Dutch Brand gasket shellac compound shall not be transported on steamers carrying passengers. (Ruling, January, 1926.)

Dynamite shall not be carried on passenger vessels as stores or cargo. (R. S.)

Dynamo oil, 400° fire test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Eaco metal polish shall not be used as stores on passenger or pleasure steamers and shall not be transported on such steamers. (Ruling, February, 1916.)

E. & R. liquid cream metal polish may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1922.)

Ebonol may be transported on steamers carrying passengers, under the same restrictions as refined petroleum. (Ruling, May, 1922.)

Ebonol reducer shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Economy Lubricating Co. metal polish. *See* Noninflammable, noncombustible, nonexplosive metal polish.

Electric-blasting caps shall not be carried on steamers carrying passengers. (Ruling, October, 1912.)

Electric squibs may be transported on steamers carrying passengers, if stowed in the magazine of the steamer. (76824.)

Electrolyte may be transported on steamers carrying passengers, under the same conditions as sulphuric acid. (Ruling, October, 1915.)

Empty chlorine-gas cylinders may be transported on steamers carrying passengers, provided that while the cylinders are still on the pier the escape valves are opened wide long enough to let the residual chlorine come to atmospheric pressure, and then closed tightly. (Ruling, December, 1929.)

Empty gasoline receptacles that have been filled with gasoline may be transported on steamers carrying passengers, provided they have been fully drained and steamed out, due care being taken to ascertain that the steaming is so thoroughly done that there will be no possibility of accumulation of gases. (Ruling, February, 1916.)

Emulsion disinfectant may be used as stores on passenger or pleasure steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Enamel leather dressing shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Enduro insecticide, manufactured by the Century Chemical Co., New York, N. Y., may be transported on steamers carrying passengers without restriction and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1928.)

Enoz moth liquid, manufactured by the Enoz Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1922.)

Enoz moth liquid, special, manufactured by the Enoz Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, November, 1922.)

Enz-Odr, a disinfectant, manufactured by the Engelite Products Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, July, 1929.)

Ether shall not be carried on passenger vessels as stores or cargo; only supply for anesthetic purposes may be carried. (Ruling, September, 1912.)

Ethereal antiseptic soap shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1913.)

Ethyl acetate, or acetic ether, shall not be carried on passenger vessels as stores or cargo. (Ruling, November, 1918.)

Ethyl bromide shall not be carried on passenger vessels as stores or cargo. (70078–71.)

Ethyl chloride shall not be carried on passenger vessels as stores or cargo. (Ruling, May, 1917.)

Ethylene may be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the requirements of the Interstate Commerce Commission, care being taken to see that they are stowed on deck. (Ruling, May, 1927.)

Eucadola may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, September, 1920.)

Eureka metal polish, manufactured by the George Williams Co., Cleveland, Ohio, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1924.)

Explosives shall not be carried on passenger vessels as stores or cargo. (Sec. 232, act of March 4, 1909.)

Ezyon and Ezyoff, a metal polish powder, manufactured by the Quality Chemical Corporation, Cleveland, Ohio, may be transported on steamers carrying passengers, and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1929.)

Ferric chloride. *See* Perchloride.

Ferrophosphorus shall not be transported on steamers carrying passengers. (Ruling, October, 1924.)

Ferrosilicon. Lots of ferrosilicon whose average silicon content lies between 48 and 65 per cent silicon shall not be shipped on passenger vessels. No ferrosilicon shall be accepted for shipment that has been made in a furnace previously used for making calcium carbide or ferrophosphorus unless the furnace has previously been entirely relined. Lots of ferrosilicon whose average silicon content lies between 45 and 48 per cent or 65 and 70 per cent may be shipped on passenger vessels only when a satisfactory certificate of analysis as to silicon content is supplied to the carrier and when the carrier is satisfied that the material has been stored, in the size in which it is to be packaged and shipped, for a period of at least one month. Lump ferrosilicon shall be stored in piles not higher than 3 feet. It need not be turned over during storage. Crushed ferrosilicon (material crushed to pass a 2-inch or finer meshed screen) shall be stored in piles not higher than 18 inches, and the piles shall have been turned over so as to bring the material at the bottom of the pile into free contact with the air at least once during the period of storage. At least a week shall have elapsed between a turning over of the pile and packaging for shipment. The material shall not be coated with oil, paraffin, or other foreign substance. If after one month's storage any odor of phosphine is noted, or if the lumps of ferrosilicon can be crumbled in the hand, the carrier shall refuse shipment to such portions of the pile as are affected if they can readily be separated from unaffected portions, or, in his discretion, may refuse shipment to the whole pile. There shall be no restrictions upon the shipment of ferrosilicon containing less than 45 per cent or more than 70 per cent silicon. Suitable certificate of analysis shall be required by the carrier to establish the silicon content. Ferrosilicon shall be stowed on shipboard in a dry, well-ventilated place, so located and ventilated that any escaping gases can not reach the quarters of the crew or passengers. Precautions must be taken so that waves, spray, rain, or bilge water can not come in contact with the packages or the ferrosilicon. (Ruling, August, 1929.)

Fibreloid. *See* Nitrocellulose products.

Films of kodaks and other cameras may be transported on steamers carrying passengers, when packed in the following manner: Each spool or dozen sheets wrapped in foil and individual cartons then packed in wooden boxes or in strong fiber boxes, properly sealed. (Ruling, November, 1919.)

Films, moving-picture. *See* Moving-picture films.

Fireproof dustless sweeping compound may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1922.)

Fireproof dustless sweeping compound, manufactured by the National Sawdust Co., Brooklyn, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1924.)

Firestone hold fast patch stock, manufactured by the Firestone Tire & Rubber Co., Akron, Ohio, shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1923.)

Fireworks; common fireworks may be transported on steamers carrying passengers, provided that they are stowed in safe places, but not in the lower hold. Special fireworks may be carried on steamers carrying passengers, when stowed in the magazine of the ship or when carried on the open deck. (Ruling, September, 1915.)

Fiske's marine auxiliary illuminating oil may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, April, 1916.)

Flash-light powder shall not be used in taking pictures on passenger vessels. (Ruling, September, 1929.)

Flit, an insecticide, manufactured by the Standard Oil Co. of New Jersey, New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1924.)

Flux. *See* Trinidad flux.

Flyosan, an insecticide, manufactured by the Colonial Chemical Corporation, Reading, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1920.)

Formaldehyde may be transported on steamers carrying passengers. (Ruling, November, 1918.)

Formic ether, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., shall not be transported on vessels carrying passengers. (Ruling, July, 1929.)

Fowler's solution. *See* Arsenic compounds.

Frank Miller's metal polish may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, November, 1917.)

Freezone corn cure shall not be transported on steamers carrying passengers. (Ruling, November, 1921.)

French's metal polish, the kind submitted by A. H. D. French, Malden, Mass., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1915.)

Frencholina, a disinfectant, may be transported on steamers carrying passengers, care being taken to ship it in the usual manner followed by the trade. (Ruling, November, 1918.)

Frierson's fly driver and mosquito exterminator may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1921.)

Fruit ethers, as follows: Acetic ether, amyl formiate, butyric ether, formic ether, nitric ether, pelargonic ether, and valerianic ether, manufactured by George Lueders & Co., New York, N. Y., shall not be transported on vessels carrying passengers. (Ruling, July, 1929.)

Fruit ethers, as follows: Amyl acetate, amyl butyrate, amyl valerianate, and benzoic ether, manufactured by George Lueders & Co., New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, July, 1929.)

Fuller genuine coal tar. *See* Coal tar.

Fulminate, dry, in bulk, shall not be carried on passenger vessels as stores or cargo. (Ruling, June, 1910.)

Fulminate of mercury, in detonators. *See* Detonators.

Fuming sulphuric acid. *See* Sulphuric acid.

Fuse, safety, which consists of a core of granular black powder which is surrounded by yarn, tape, pitch, rubber, etc., may be carried without restriction on steamers carrying passengers. Safety fuses of this kind should be packed in strong wooden boxes, barrels, or other secure packages properly marked. (Ruling, June, 1919.)

Fuses may be transported on steamers carrying passengers, under the same conditions as gunpowder. (65297.)

Fuses, electric, shall not be carried on passenger vessels as stores or cargo. (Ruling, May, 1910.)

Fuses, electric, except those containing fulminate of mercury, may be treated as gunpowder or small-arms ammunition and may be transported on steamers carrying passengers, under the provisions of section 4472, Revised Statutes. (Ruling, April, 1910.) This does not apply to emigrant vessels. (40257.)

Fuses for shrapnel shells shall not be carried on passenger vessels as stores or cargo. (Ruling, July, 1915.)

Galena-Marine signal oil may be used as stores on passenger or pleasure steamers and may be transported on steamers carrying passengers. (Ruling, April, 1916.)

Gas can not be manufactured or used for illuminating purposes on passenger vessels. (Ruling, February, 1912.)

Gasket shellac compound, Dutch Brand, submitted by Van Cleef Bros., Chicago, Ill., shall not be transported on steamers carrying passengers. (Ruling, January, 1926.)

Gas Oil, manufactured by the Standard Oil Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1927.)

Gas Oil, as submitted by Wessel, Duval & Co., New York, N. Y., having a flash point of 266° F. and a fire point of 304° F., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, November, 1922.)

Gasoil, manufactured by the Crown Central Oil Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1926.)

Gasoline is not allowed, under section 4472, Revised Statutes, to be carried as stores on steamers carrying passengers. (Ruling, October, 1912.)

Gasoline engine; it is unlawful to use a gasoline engine to drive an electric generator on board a pleasure steamer subject to inspection. (Ruling, August, 1913.)

Genasco asphalt putty shall not be transported on steamers carrying passengers. (Ruling, January, 1919.)

Genasco asphaltum varnish structural paint. *See* Positive seal priming.

Genasco metal preservative may be transported on steamers carrying passengers, it being understood that it be packed in tin cans ranging from 1 to 10 gallons each, which are in turn incased in a wooden box containing 1 to 2 cans per case, and that, in addition to packing the material in tin cans, it is also packed at times in double-head hardwood barrels of 30 and 50 gallons capacity, as well as in steel drums having a capacity of 50 gallons. (Ruling, April, 1918.)

Genasco roof coating may be transported on steamers carrying passengers, it being understood that it will be packed in tins ranging from 1 to 10 gallons each, which are in turn incased in a wooden box containing 1 to 2 cans per case, and that, in addition to packing the material in tin cans, it is also packed at times in double-head hardwood barrels of 30 and 50 gallons capacity, as well as in steel drums having a capacity of 50 gallons. (Ruling, April, 1918.)

General Roofing Co.'s roofing cement, having a flash point of not less than 239° F. and fire point of not less than 253.4° F., may be transported on steamers carrying passengers. (Ruling, April, 1915.)

Glacial acetic acid may be transported on deck on steamers carrying passengers. (Ruling, October, 1915.)

Gliddenite metal polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1917.)

Glidden's metal polish shall not be transported on steamers carrying passengers or be used as stores on passenger or pleasure steamers. (Ruling, October, 1917.)

Glue cement, manufactured by L. W. Ferdinand Co., Boston, Mass., may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, June, 1929.)

Glynoin oil. *See* Nitroglycerin.

Goodrich rubber cement shall not be transported on steamers carrying passengers. (Ruling, December, 1921.)

Goodyear tube repair kit. *See* Tube repair kit.

Grady's liquid scouree polish shall not be used as stores on passenger or pleasure steamers and shall not be transported on steamers carrying passengers. (Ruling, November, 1916.)

Grady's marvelous metal cleaner and polish, manufactured by the Grady Mfg. Co., Long Island City, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1926.)

Grady's scouree, manufactured by the Grady Mfg. Co., Long Island City, N. Y., may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1926.)

Grady's scouree polish in paste form may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

Gunpowder shall not be carried on passenger vessels as stores or cargo. Restriction applies to all common carriers carrying passengers. For ruling and exceptions thereto, see section 232, act of March 4, 1909, page 180. Carried in passenger vessels only under special license. (R. S.)

Handcraft stains, fumed oak, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Hanite, explosive, shall not be carried on passenger vessels as stores or cargo. (Ruling, February, 1912.)

Hat Brite, gloss black, coloring solution, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Hay, loose, shall not be carried on passenger vessels as stores or cargo. (R. S.)

Heaney's marine metal polish may be used as stores on passenger or pleasure steamers and may be transported on passenger steamers. (Ruling, April, 1916.)

Heaney's metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1915.)

Heller's golden shine metal polish shall not be transported on steamers carrying passengers or used as stores on passenger or pleasure steamers. (Ruling, June, 1917.)

Hemp; no bales of imported or domestic hemp shall be received on any vessel carrying passengers, unless the same are properly compressed, bound with rope, wire, or metallic bands, and covered on ends or sides, according to the several methods now practiced in foreign and domestic trade. (Sec. 4472, R. S.)

Hemp, loose or in poorly compressed and covered bales, shall not be carried on passenger vessels as stores or cargo. (R. S.)

High explosives on motor boats; while there is no law that prohibits the transportation of dangerous articles on motor boats of any class, this bureau considers it highly imprudent and very indiscreet to carry high explosives or dangerous articles of any character on any vessel that carries passengers for hire. (Ruling, January 3, 1919, file 34040.)

High light lacquer shall not be carried on passenger vessels as stores or cargo. (70078–50.)

Hindu Wizard, a liquid insecticide, manufactured by the East Indian Chemical Co. (Inc.), New York, N. Y., may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1926.)

Hirshe Manufacturing Co. metal polish, as submitted August 14, 1913, may be transported on steamers carrying passengers under the same conditions as refined petroleum, upon routes where there is no other practical mode of transporting the same, but the polish can not be used as stores on any pleasure or passenger steamer. (Ruling, October, 1913.) As submitted October 3, 1913, it may be used as stores on pleasure or passenger steamers. (Ruling October, 1913.)

Holder or creosote oil, having a fire point of not less than 110° F., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, July, 1920.)

Horsford's acid phosphate may be transported on steamers carrying passengers. (Ruling, October, 1918.)

Hoynesite, an explosive, may be transported on steamers carrying passengers, under the same conditions as gunpowder. (Ruling, August, 1921.)

Hutch-Olene, a gasoline intensifier, manufactured by the Hutch-Olene Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, February, 1925.)

H. W. Johns-Manville Co.'s roofing cement may be transported on steamers carrying passengers, if carried in absolutely tight containers. (Ruling, July, 1920.)

Hydrochloric acid may be transported on steamers carrying passengers, under the same conditions as sulphuric acid. (Ruling, October, 1918.)

Hydrocyanic acid; the usual 2 per cent solution may be accepted for transportation in 1-pound bottles, and in lots of five or less bottles if properly protected against breakage and surrounded by a satisfactory absorbent and the whole inclosed in a tight metallic container. Each individual package and the container should be marked with the name and the word "Poison." Hydrocyanic acid so packed may be packed with other chemicals in the same case, which should be marked "Poison." (40256.)

Hydrogen gas shall not be transported on steamers carrying passengers. (Ruling, September, 1921.)

I. C. U. metal polish and I. C. U. nickel polish shall not be carried as stores or cargo on passenger steamers. (Ruling, September, 1914.)

Ignition powder may only be transported on passenger steamers, under the same conditions as gunpowder. (70078–2.)

Illuminating gas. *See* Gas.

Ink. *See* Photogravure inks.

Inland Lake metal polish, manufactured by George B. Carpenter & Co., Chicago, Ill., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1923.)

Insecticide, submitted by C. S. Jones, Detroit, Mich., for exterminating bedbugs and roaches, may be transported on steamers carrying passengers but shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1924.)

Insecticide, manufactured by the Tanglefoot Co., Grand Rapids, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1927.)

Insecticides containing prohibited articles are subject to the same restrictions as disinfectants. (40256.)

Instant sanitary cleanser, submitted by the Globe Chemical Co., being non-inflammable, may be transported on steamers carrying passengers. (Ruling, May, 1912.)

International roofing cement shall not be transported on steamers carrying passengers. (Ruling, March, 1917.)

Iron sponge or iron mass when properly oxidized may be transported on steamers carrying passengers. (Ruling, November, 1928.)

Ishine powder and liquid metal polish, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1922.)

Isolite. *See* Pintsch gas.

Izen, used to prevent rust and tarnish on metallic surfaces, manufactured by the Alaco Products Sales Corporation, Jersey City, N. J., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, February, 1924.)

Japan drier may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

J–M liquid lap cement may be transported on steamers carrying passengers. (Ruling, April, 1917.)

J–M liquid roof coating shall not be transported on steamers carrying passengers. (Ruling, April, 1917.)

J–M steep roofing cement may be transported on steamers carrying passengers. (Ruling, April, 1917.)

J–O bug-roach powder may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure vessels. (Ruling, April, 1916.)

J–O roach and rat paste may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure vessels. (Ruling, April, 1916.)

Johns-Manville Co. roofing cement. *See* H. W. Johns-Manville Co.

Justrite spirits may be transported on steamers carrying passengers, under the same condition as turpentine. (Ruling, July, 1911.)

Jute may be transported on steamers carrying passengers under the same conditions as provided for cotton or hemp. (Ruling, March, 1929.)

Kanite shall not be carried on passenger vessels as stores or cargo. (Ruling, February, 1912.)

Kemoshyne auto body polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it, but it shall not be used as stores on passenger and pleasure steamers. (Ruling, November, 1914.)

Kemoshyne metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, November, 1914.)

Kerosene. *See* Oils, illuminating.

Kilall, an insecticide, germicide, deodorant, and cleanser, submitted by W. H. and F. Jordan, jr., Mfg. Co., Philadelphia, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it is not to be used as stores on pleasure or passenger vessels. (Ruling, April, 1922.)

Kil-Bug, manufactured by the West Disinfecting Co., Washington, D. C., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1920.)

Kiltik cattle dip may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

Kilzum insecticide may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, June, 1915.)

King's metal polish may be carried as stores on pleasure steamers or steamers carrying passengers if it has a fire point of more than 300° F. (Ruling, August, 1911.)

King's steamboat polish shall not be carried as stores on passenger steamers. (Ruling, August, 1911.)

Kleanco polishing preparation may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, December, 1919.)

Knox-Tarnish, manufactured by the Dolphin Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, August, 1926.)

Kodalak shall not be transported on steamers carrying passengers. (Ruling, April, 1925.)

Kolfene, a disinfectant, submitted by the United States Sanitary Specialties Corporation, Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Kramer cream metal polish marked "Inflammable" shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger steamers. (Ruling, April, 1924.)

Kramer cream metal polish marked "Noninflammable" may be transported on steamers under the same conditions as refined petroleum and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1924.)

Kreso, manufactured by Parke Davis & Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure vessels. (Ruling, July, 1921.)

Krodeproof, an emulsified asphalt, submitted by the Lewis Asphalt Engineering Co., New York, N. Y., may be transported on steamers carrying passengers, without restriction. (Ruling, October, 1929.)

Kwick Cleaner polish, manufactured by the Solarine Co., Baltimore, Md., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1929.)

Kwyk metal polish may be used as stores on pleasure or passenger steamers, and may be transported on steamers carrying passengers. (Ruling, April, 1916.)

Kyso mineral spirits shall not be transported on steamers carrying passengers and shall not be used as stores on passenger or pleasure vessels. (Ruling, December, 1929.)

Lactic acid may be transported on steamers carrying passengers. (Ruling, December, 1918.)

Lacquers, lacquer thinners, and similar products may be transported on steamers carrying passengers under the same conditions as varnishes. (Ruling, May, 1928.)

Lampblack may be transported on steamers carrying passengers, provided the said commodity is cool when packed and is packed in tight containers. (Ruling, April, 1924.)

Lead arsenate. *See* Arsenic compounds.

Lead dross and type dross, consisting of metal oxides mingled with particles of metal, are not inflammable or explosive, and the only conceivable risk would be the evolution of small amounts of the inflammable and poisonous gases, arsine and stibine, which might be formed by the action of strong acids upon metallic particles. The department further states that it has been informed that waste material from sulphuric acid tanks is also called lead dross, and that there can be no question that this is dangerous and should not be offered for shipment. (Ruling, April, 1914.)

Lead dross or waste material from sulphuric acid tanks does not include lead dross or type dross, consisting of metal oxides mingled with particles of metal, and shall not be carried on passenger vessels as stores or cargo. (63086 and 63412.)

Leptyne, a paint thinner, manufactured by the Pittsburgh Plate Glass Co., Newark, N. J., may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, June, 1929.)

Liberty polish, a metal polish, manufactured by the Scranton Chemical Co., Scranton, Pa., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1927.)

Lightning metal polish, manufactured by the Century Chemical Products Co., Detroit, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Lime, hydrated or slaked, may be transported in bags, properly marked with name, on steamers carrying passengers. (Ruling, July, 1910.)

Lime, unhydrated, or quicklime may be transported on steamers carrying passengers, when contained in strong, water-tight metal receptacles or in strong, heavy, water-tight barrels, such as wine or whisky barrels, and shall be stowed on deck. (Ruling, (April, 1917.)

Lime sulphur solution may be transported on steamers carrying passengers, when properly stowed. (Ruling, June, 1926.)

Lincoln roof cement, manufactured by the Lincoln Paint & Oil Co., Cleveland, Ohio, may be transported on steamers carrying passengers. (Ruling, March, 1929.)

Linseed oil is not a dangerous article as contemplated by section 4472, Revised Status, and it may be transported upon steamers carrying passengers. (Ruling, November, 1911.)

Liquid bleach and caustic soda may be transported on steamers carrying passengers. Liquid bleach should be packed in suitable water-tight containers and caustic soda, which is ordinary concentrated lye, may be packed in tight metal containers, or even in glass bottles, which are properly packed to prevent excessive danger of breaking. (Ruling, October, 1916.)

Liquid cream metal polish, manufactured by Joseph Wachtel, Cleveland, Ohio, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Liquid imperial metal polish shall not be used as stores on passenger steamers. (Ruling, August, 1916.)

Liquid lap cement may be transported on steamers carrying passengers. (Ruling, January, 1918.)

Liquid metal polish, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1922.)

Liquid metal polish and paint, lacquer, enamel, tile, and glazed brick cleaner submitted by the Quality Chemical Specialties, Cleveland, Ohio, may be transported on steamers carrying passengers without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, February, 1929.)

Locktite tire patch outfits, manufactured by the Locktite Patch Co., Detroit, Mich., may be transported on steamers carrying passengers, under the same conditions as rubber cements; that is, on deck, covered over, convenient for jettison in case of emergency, or if stowed in a properly constructed magazine safely removed from fire. (Bulletins, November 1, 1926, and January 3, 1927.)

Lunarine metal polish, manufactured by the Solarine Co., Baltimore, Md., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, January, 1928.)

Lustre Perino German metal polish may be used as stores on steamers carrying passengers. (Ruling, August, 1912.)

Luxo Flash powder may be transported on steamers carrying passengers, under the same conditions as gunpowder. (Ruling, June, 1915.)

Lye, concentrated. *See* Liquid bleach.

Lysol may be transported on steamers carrying passengers. Small quantities of lysol may be packed in mixed shipments of drugs and chemicals. Glass bottles up to ½ gallon capacity or tin cans up to 5 gallons containing lysol are safe if packed in suitable wooden cases. Where large quantities are carried it shall be stowed on deck where it may be easily jettisoned in case of necessity. (Ruling, June, 1918.)

Macomber wave oil may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, April, 1916.)

Magic cloths, manufactured by the Chapman Co., Kansas City, Mo., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Magnetic metal polish, manufactured by the Magnetic Polish Co. (Inc.), St. Louis, Mo., may be transported on steamers carrying passengers under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1929.)

Magnesium nitrate may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Magnolene signal oil may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, June, 1916.)

Malthoid cement paint may be transported on steamers carrying passengers. (Ruling, January, 1917.)

Manganese borates may be transported on steamers carrying passengers. (Ruling, May, 1915.)

Manganese chloride, solution of, may be transported on steamers carrying passengers when packed with absorbent material, which may be mineral wool, sifted ashes, or infusorial earth. (Ruling, January, 1930.)

Marine illuminating oil, Liberty Oil Co., New Orleans, La., may be used as stores on passenger or pleasure steamers and may be transported on such steamers. (Ruling, April, 1916.)

Marine illuminating oil "A" and "B," manufactured by the National Refining Co., Findlay, Ohio, may be used as stores on passenger or pleasure steamers. (Ruling, November, 1915.)

Marine illuminating oil "C" and "L" may be used as stores on passenger or pleasure steamers. (Ruling, February, 1916.)

Marine oil, No. 10, 400° test. *See* No. 10 Marine oil.

Marine Spray No. 9, manufactured by McCormick & Co. (Inc.), Baltimore, Md., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, October, 1927.)

Marvelac, orange, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Masurite, explosive, shall not be carried on passenger vessels as stores or cargo. (Ruling, October, 1911.)

Matches, so-called safety matches, which include the ordinary paper-book matches or strike-on-box matches, may be transported on steamers carrying passengers, when packed in strong outside containers either of wood or of proper fiber-board construction. (Ruling, March, 1923.) So-called strike-anywhere matches or friction-tip matches may be transported on steamers carrying passengers when meeting all the requirements of paragraph 1836 and container specification No. 6, as set forth in the regulations for the transportation of explosives and other dangerous articles by freight, and specifications for shipping containers as promulgated by the Interstate Commerce Commission. (Ruling, June, 1923.)

Mayflower metal polish, manufactured by the International Metal Polish Co. (Inc.), Indianapolis, Ind., may be transported on steamers carrying passengers without restriction and may be used as stores on pleasure or passenger vessels. (Ruling, July, 1928.)

Menalitt powder shall not be carried on passenger vessels as stores or cargo. (Ruling, September, 1911.)

Mercuric chloride may be shipped in pound bottles, well cushioned, of not over 5-pound lots in the same case with other chemicals. In bulk of not more than 10 pounds the same should be shipped in wooden boxes and the case be marked plainly with the name and the word "Poison." (40256.)

Metalbrite, a metal polish manufactured by the Golden State Laboratories, Larkspur, Calif., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels without restriction. (Ruling, April, 1928.)

Metal bronzes and polishes, general ruling: Metal bronzes and polishes containing prohibited articles should be subject to the same restrictions as disinfectants. (40256.) (See individual cases.)

Metallic sodium may be transported on steamers carrying passengers, providing it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn should be packed in water-tight metallic cases, securely boxed in a case of sufficient strength to withstand hard usage, and the case must never be stowed where water can reach it, whether from leaky pipes, spray, or in any other way; and it is also further provided that the case shall not be stowed in places containing combustible material. (Ruling, November, 1911.)

Metal polish, manufactured by Brown Laboratories, Woodhaven, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1927.)

Metal polish, manufactured by the Randall Products Corporation, Stapleton, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, August, 1927.)

Metal polishes unable to withstand fire test of 300° F. shall not be carried on steamers carrying passengers, as stores or cargo. (40256.) (See individual metal polishes.)

Metal polishing paste (No. 1), manufactured by the Brown Laboratories, New York, N. Y., may be transported on steamers carrying passengers under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1928.)

Metalustre metal polish may be transported under the same conditions as refined petroleum, on steamers carrying passengers upon routes where there is no other practicable mode of transporting it, but it may not be used as stores on passenger or pleasure steamers. (Ruling, June, 1914.)

Methyl acetone shall not be transported on steamers carrying passengers. (Ruling, January, 1925.)

Methyl chloride may be transported on steamers carrying passengers, when contained in cylinders that meet, in all respects, the requirements of the Interstate Commerce Commission, it being understood that each shipment of this commodity shall consist of not more than 10 of the 90-pound cylinders, and that these cylinders shall be carried on deck in an upright position, valves uppermost, and where they will not be exposed to direct sunlight or to artificial heat. (Ruling, March, 1927.)

Mexoline metal polish shall not be used as stores or carried as cargo on passenger or pleasure steamers. (69989–12.)

Miller's metal polish. *See* Frank Miller's metal polish.

Mill Spray, an insecticide, manufactured by the Perolin Co. of America, Detroit, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Mineral colza, sperm oil. *See* Oil, mineral colza, etc.

Mineral spirits, Fuller, may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1927.)

Mirbane oil. *See* Nitrobenzol.

Moco monkey-grip cement may be transported without restriction on steamers carrying passengers. (Ruling, July, 1920.)

Monogram shoe polish, manufactured by the Fulton Shoe Polish Co., New York, N. Y., may be transported on steamers carrying passengers, when contained in tins packed in well-nailed and iron-strapped wooden cases lined with waterproof paper and stowed in a secure part of the vessel. (Ruling, June, 1921.)

Mono-Nitro-Benzole. *See* Nitrobenzol.

Mononitrotoluol. *See* Dinitrotoluol.

Morganbrite metal polish, manufactured by the Morgan Manufacturing Co., Newport, R. I., can not be carried on steamers carrying passengers nor used as stores on passenger or pleasure steamers. (Ruling, July, 1914.)

Morganbrite metal polish, with flash and fire point of below 338° F., shall not be carried as stores or cargo on passenger steamers. (Rulings, July, 1914, and April, 1915.)

Mosquito-bite cure and insect destroyer, manufactured by Sallade & Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, September, 1923.)

Motion-picture films; small piece of noninflammable or acetate cellulose film may be transported on steamers carrying passengers with each toy moving-picture machine of the Keystone Manufacturing Co., when the film is packed in tightly closed metal cases. (Ruling, June, 1924.)

Motion-picture films may be transported on steamers carrying passengers, under the same conditions as are laid down by the Interstate Commerce Commission with reference to packing and labeling of the same. (Ruling, April, 1917.)

Murcote, a nitrocellulose lacquer, manufactured by the Murphy Varnish Co., Newark, N. J., shall not be transported on steamers carrying passengers, as it has been found to flash and burn at 3° C. (26.6° F.), and would, therefore, not even come within the ruling covering varnishes. (Ruling, February, 1928.)

Muriatic acid may be accepted for transportation under the same conditions as sulphuric acid. (Ruling, June, 1915.) In addition, it may also be transported in the proper type of wooden barrels, properly lined with rubber, when these barrels conform in every respect with the requirements of the Interstate Commerce Commission as laid down in their shipping container specification No. 9. (Ruling, June, 1924.)

Murray's bedbug doom may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, July, 1916.)

Mustard gas shall not be transported on steamers carrying passengers. (Ruling, February, 1926.)

Myco, a disinfectant, manufactured by the Masury-Young Co., Boston, Mass., when diluted with water, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1929.)

Naphtha shall not be carried as stores or cargo on passenger steamers. (R. S.)

Naphthalin crudum and naphthalin sublimatum may be transported on steamers carrying passengers when packed in strong wooden barrels or casks. (Ruling, May, 1915.)

Naphtha soap; all so-called naphtha soaps may be transported on steamers carrying passengers only when stowed on the open deck or in properly ventilated spaces on or above the main deck. (Ruling, June, 1914.)

National metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1916.)

National storm oil shall not be used as stores on steamers carrying passengers. (Ruling, January, 1916.)

Neponset roofing cement may be transported on steamers carrying passengers. (Ruling, July, 1916.)

Neptune Belt Cement, manufactured by the Graton & Knight Manufacturing Co., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger steamers. (Ruling, November, 1924.)

Nitrate of ammonia is not a like dangerous article to those articles named in section 4472, Revised Statutes, and may be transported on steamers carrying passengers, provided it is specially stowed where it is readily accessible in case of fire. (Ruling, October, 1919.)

Nitrate of potash. *See* Saltpeter.

Nitrate of soda, in bags, boxes, or barrels, may be transported on steamers carrying passengers, provided it is specially stowed where it is readily accessible in case of fire and where there is no danger of contact with water. (Ruling, May, 1914.)

Nitrated oil, or powder or fiber mixed or saturated with same, shall not be carried on passenger steamers as stores or cargo. (R. S.)

Nitric acid may not be transported on steamers carrying passengers, except on the guards or on the decks thereof, or in such other safe parts of the vessel as shall be prescribed by the local inspectors. (Ruling, October, 1918.)

Nitric ether, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, July, 1929.)

Nitrobenzene, same as nitrobenzol.

Nitrobenzol, or mirbane oil, may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1921.)

Nitrocellulose, wet with 20 per cent of water, may be transported on steamers carrying passengers, when packed in zinc containers hermetically sealed. (Ruling, December, 1913.) When stowed between decks, it must be stowed where it will be readily accessible. (Ruling, February, 1929.) Nitrocellulose, wet with 30 per cent of alcohol, shall not be transported on steamers carrying passengers. (Ruling, March, 1928.)

Nitrocellulose products, the pyroxylin plastics, whether designated as celluloid, viscoloid, pyralin, fibreloid, xylonite, or otherwise, are not dangerous articles within the contemplation of section 4472, Revised Statutes, when their transportation is attended with care and their stowage and location in the ship attended with adequate precaution against fire. Sheets or other original forms of the above-mentioned articles, articles whose composition is more than 10 per cent thereof, or articles whose nitrocellulose attachments consist of more than 10 per cent of the aggregate weight of the article must be carried in places convenient of access—that is to say, in the deck houses or the upper between decks of ocean steamers, or on the covered main deck of lake, bay, sound, or river steamers—but articles whose composition or attachments are made up of less than 10 per cent of their weight of nitrocellulose products may be carried in any part of the ship remote from excessive heat. (Ruling, October, 1909.)

Nitrogen gas may be transported in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, September, 1922.)

Nitroglycerin, or powder or fiber mixed or saturated with same, shall not be carried on passenger steamers as stores or cargo. (R. S.)

Nitroleum, or powder or fiber mixed or saturated with same, shall not be carried as stores or cargo on steamers carrying passengers. (R. S.)

Nitrous-oxide gas may be transported on the decks of steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, August, 1918.)

Nitro Valspar, automobile varnish, shall not be transported on steamers carrying passengers. (Ruling, July, 1927.)

Nobugitol, an insecticide, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

No. 3 Patent-leather repairer shall not be transported on steamers carrying passengers. (Ruling, May, 1917.)

No. 10 Marine engine oil, 400° test, may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Nonexplosive metal polish, submitted by the Standard Oil Co., of San Francisco, Calif., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, January, 1925.)

Noninflammable Bras-Brite polish may be used as stores on passenger or pleasure steamers and may be transported on such steamers. (Ruling, May, 1916.)

Noninflammable metal polish, Geo. W. Hoffman Co., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, August, 1916.)

Noninflammable, noncombustible, nonexplosive metal polish, manufactured by the Economy Lubricating Co., Charlestown, Mass., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, August, 1915.)

Noskeaj mystic cleaner, manufactured by the Karbryte Commercial Polishes Co., San Francisco, Calif., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1924.)

Noxon Cleaner polish, manufactured by the Noxon Chemical Products Co., Newark, N. J., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1924.)

Noxon Universal cleaner-polish, manufactured by the Noxon Chemical Products Co., Newark, N. J., may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, May, 1921.)

Nugas, a product put on the market by the Nugas Corporation, of Greenwich, Conn., may be transported on steamers carrying passengers when contained in cylinders that meet the requirements of the Interstate Commerce Commission. (Ruling, May, 1924.)

Nujol, manufactured by the Standard Oil Co. of New Jersey, does not come within the prohibitions of section 4472, Revised Statutes. (Ruling, September, 1915.)

Nu Maid polish may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, July, 1927.)

Odorex, a deodorant, manufactured by the Flint-Holden Sales Co., Detroit, Mich., may be transported on steamers carrying passengers, without restriction, and can be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Odorono may be transported, without restriction, on steamers carrying passengers. (Ruling, December, 1918.)

Oflyo disinfectant, manufactured by the American Disinfecting Co., Sedalia, Mo., may be transported on steamers carrying passengers, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1929.)

Oil, asphaltum, which will not ignite at a temperature less than 110° F., may be carried under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, February, 1912.)

Oil, banana. *See* Amyl acetate.

Oil, crude. *See* Petroleum, crude.

Oil, cylinder. *See* Cylinder oils.

Oil, dynamo. *See* Dynamo oil.

Oil, fuel and road, produced from crude petroleum by a process of refining, and that will not ignite at a temperature less than 110° F., may be carried on steamers carrying passengers under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it. (Ruling, January, 1912.)

Oil, fuel, packed in wooden barrels, shall not be carried on passenger steamers as stores or cargo. (40488 and 47781.)

Oil, high-test fuel, may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting it. (Ruling, August, 1911.)

Oil, illuminating; kerosene or other illuminating oils meeting the requirements of the law must be stored in metallic tanks or cans and carried in the oil rooms or lamp lockers constructed in accordance with the general rules and regulations. (Ruling, May, 1918.)

Oil, illuminating, with low flash and fire points. Oil with a fire point of 145° F. and a flash point of 112° F. should not be used as stores on any vessel, and, although this service has no jurisdiction in the matter of oil used as stores on other than passenger and pleasure steamers, it is suggested that oil used for illuminating purposes should have a fire point of not less than 300° F. (Ruling, May 8, 1915, file 70692.)

Oil, lubricating, may be stored as heretofore in secure tanks, casks, or cans in the engine-room compartments or storeroom, or in metal-lined lamp lockers or oil room. (Ruling, May, 1918.) (See rulings on certain specified lubricating oils.)

Oil, lubricating, Penzoil Co., may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, lubricating, 600° test oil, Crystal Oil Works, may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, lubricating, 600° flash oil, Independent Refining Co., may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, lubricating, medium auto oil No. 1356, Independent Refining Co., may be transported on steamers carrying passengers. (Ruling, May, 1927.)

Oil, marine No. 10, 400° test. *See* No. 10 marine oil.

Oil, mineral colza, mineral sperm, spermoline, and 300° test illuminating oil, may be transported under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting these commodities. Those standing a fire test of 300° F. are not restricted. (Rulings, June, 1914, and April, 1916.)

Oil, mineral seal, is to be classed as refined petroleum, and therefore shall not be used as stores on passenger or pleasure steamers. (Ruling, November, 1915.)

Oil No. 1. *See* Galena-Marine signal oil.

Oil, petroleum, tanners', may be transported under the same conditions as refined petroleum. (45222.)

Oil, petroleum, wool, may be transported under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, July, 1911.)

Oil, shale or paraffin, can not be used for the purpose of operating auxiliary apparatus for electric lighting or wireless equipment. (Ruling, January, 1914.)

Oil, sole leather, may be transported under the same conditions as refined petroleum upon steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, July, 1911.)

Oil, 600° W. *See* W. Oil 600°.

Oiled clothing may be carried on steamers carrying passengers, provided that it is stowed separate and apart from any other cargo, and where it may be easily jettisoned in case of spontaneous combustion. Furthermore, if during manufacture the clothing is treated with linseed oil, it should be thoroughly dried before being submitted for shipment, in order to oxidize the linseed oil and eliminate danger from spontaneous heating. (Ruling, February, 1915.)

Oil of turpentine. *See* Turpentine.

Oil of vitriol. *See* Sulphuric acid.

Oleic acid (Turkey red oil) may be transported on steamers carrying passengers. (Ruling, May, 1915.)

Oleum. *See* Sulphuric acid.

OMI brass and OMI gold and silver polish, manufactured by the OMI Products (Inc.), Brooklyn, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1929.)

One-minute fire kindlers, made of wood, wire, excelsior and cotton, and fuel oil, and packed in cartons, shall not be transported on steamers carrying passengers. (Ruling, November, 1915.)

Oronite fly spray, submitted by the Standard Oil Co. of California, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1926.)

Oxford metal polish, manufactured by the Crowell Chemical Co., Rutherford, N. J., may be transported on steamers carrying passengers, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, February, 1930.)

Oxone, being mainly sodium peroxide which has been fused into blocks or cakes, and sodium peroxide in powdered form, may be transported on steamers carrying passengers, provided that it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn shall be packed in water-tight metallic case securely boxed in a case of sufficient strength to withstand hard usage, in accordance with the method as submitted to this bureau, and with the further provision that it shall not be stored in a place containing combustible material. Furthermore, such drums should be plainly marked, showing that the material that is contained therein is inflammable and must be stored in a place where there is no combustible material. (Ruling, September and October, 1910.)

Oxygen gas may be transported as a deck load on steamers carrying passengers when contained in cylinders that have passed the inspection of the bureau of explosives and the Interstate Commerce Commission and filled at a pressure not greater than is stipulated by them. (Ruling, September, 1915.)

Paint. *See* Positive seal priming.

Paint thinner, marked "No. 22, B-TH-130," manufactured by the Hercules Powder Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, October, 1928.)

Paper caps, detonators, shall not be carried on steamers carrying passengers as stores or cargo. (43366.)

Paraffin oil may be transported on steamers carrying passengers, under the same conditions as refined petroleum upon routes where there is no other practicable mode of transporting same. (Ruling, October, 1914.)

Paraffine Paint Co. roofing cement, used in connection with their ready-roofing paper, shall not be transported on steamers carrying passengers or used as stores on such steamers. (Ruling, December, 1916.)

Paraldehyde shall not be transported on steamers carrying passengers. (Ruling, August, 1917.)

Paris green. *See* Arsenic compounds.

Parrot metal polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, September, 1915.)

Patent-leather repairer No. 3. *See* No. 3 Patent-leather repairer.

Patent vulcanite roofing cement shall not be transported on steamers carrying passengers. (Ruling, April, 1917.)

Pear oil, same ruling as applies to banana oil (amyl acetate). (Ruling, May, 1912.)

Peerless thinner may be transported on steamers carrying passengers, provided it is shipped in sealed drums as required by the Interstate Commerce Commission's specifications, and that the drums are absolutely tight. (Ruling, December, 1917.)

Pelargonic ether, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, July, 1929.)

Pep, a liquid insecticide, may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, August, 1917.)

Perchlorate of potash (potassium perchlorate) shall not be transported on steamers carrying passengers. (Ruling, November, 1929.)

Perchloric acid may be transported on steamers carrying passengers, in 1-pound containers, care being taken, however, to place the bottles in tin boxes filled with whiting to neutralize the acid in case of breakage. (70078–71.)

Perchloride of iron (ferric chloride) may be transported without restriction on steamers carrying passengers. (Ruling, November, 1915.)

Perco spray, an insecticide, manufactured by the Prince Chemical Co., Pottstown, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, January, 1927.)

Percussion caps may be transported on steamers carrying passengers, under the same conditions as small-arms ammunition. (Ruling, August, 1913.)

Perolin 15 essence shall not be used as stores on pleasure or passenger steamers nor shall it be transported on steamers carrying passengers. (Ruling, June, 1922.)

Perolin 15 essence, diluted, may be used as stores on pleasure and passenger vessels and may be transported on steamers carrying passengers. (Ruling, June, 1922.)

Peterman's ant food, manufactured by William Peterman (Inc.), New York, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1922.)

Peterman's discovery liquid, manufactured by William Peterman (Inc.), New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, November, 1922.)

Peterman's discovery paste may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (Ruling, September, 1916.)

Peterman's roach food, manufactured by William Peterman (Inc.), New York, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure and passenger vessels. (Ruling, November, 1922.)

Petroleum asphaltum of high flash point is not prohibited by section 4472, Revised Statutes, and may be transported on steamers carrying passengers. (Ruling, April, 1914.)

Petroleum, crude; steamers carrying passengers, using coal as fuel, can not carry crude oil in their double bottoms, as this would be in violation of section 4472, Revised Statutes. It would also be in violation of section 4472, Revised Statutes, for a steamer carrying passengers, using crude oil as fuel, to carry crude oil as cargo in her fuel-oil tanks. (62944.)

Petroleum, crude and refined, shall not be carried as stores or cargo on passenger steamers, except that refined petroleum with flash point of 110° F. or more may be carried under regulations where there is no other practicable mode of transporting it. (R. S.)

Petroleum ether shall not be carried on passenger steamers as stores or cargo. (70078–71.)

Petroleum pitch, submitted by the North American Chemical Co., Boston, Mass., may be transported on steamers carrying passengers, when packed in strong, tight barrels and properly stowed. (Ruling, March, 1924.)

Phenoid, paint and varnish remover, may be transported on steamers carrying passengers, under the same conditions as varnishes. The ruling in reference to varnishes is in accordance with the regulations of the Interstate Commerce Commission. (Ruling, August, 1926.)

Phenoid, type cleaner, manufactured by the Chalmers Chemical Co., Newark, N. J., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, May, 1927.)

Phenoid metal polish, manufactured by the Chalmers Chemical Co., Newark, N. J., may be transported on steamers carrying passengers. (Ruling, February, 1930.)

Phenol. *See* Carbolic acid.

Phenola, a coal-tar disinfectant, manufactured by Hemingway & Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, February, 1925.)

Phenolene, a disinfectant, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Phenyl isocynate may be transported on steamers carrying passengers, under the same conditions as refined petroleum, care being taken, however, to stow it on deck. (Ruling, August, 1927.)

Phosphoric acid, anhydrous, carbonized, and glacial, may be transported on steamers carrying passengers when it is stowed on deck, where it is at all times under the eye of an officer of the vessel, and where it can be easily jettisoned in the event of necessity. (Ruling, October, 1923.)

Phosphoric acid paste may be transported on steamers carrying passengers. (Ruling, September, 1916.)

Phosphorus, sesquisulphide of, and amorphous (red) may be transported on steamers carrying passengers, provided that these commodities are stowed in iron drums or tins in cases and carried on deck. (Rulings, August and September, 1915.)

Phosphorous trichloride may be transported on steamers carrying passengers, under the same conditions as sulphuric acid. (Ruling, June, 1920.)

Phosphorus, yellow or white, shall not be carried on passenger steamers as stores or cargo. (Ruling, September, 1913.)

Photogravure inks, manufactured by J. M. Huber (Inc.), New York, N. Y. shall not be transported on steamers carrying passengers. (Ruling, January 1929.)

Picric acid, containing 10 or 20 per cent water, shall not be carried on passenger steamers as stores or cargo. (Ruling, October, 1914.)

Pine oil soap, manufactured by the Quality Chemical Specialties, Cleveland, Ohio, may be transported on steamers carrying passengers, and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1929.)

Pine tar acid, a disinfectant, manufactured by the export department, Barrett Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure vessels. (Ruling, March, 1925.)

Pine tar oil, having a flash point of 300° F., may be transported on steamers carrying passengers. (Ruling, October, 1914.)

Pintsch gas (Isolite) is not prohibited from being carried on steamers carrying passengers by section 4472, Revised Statutes. (Ruling, April, 1915.)

Pioneer liquid asphalt roofing cement may be transported on steamers carrying passengers. (Ruling, February, 1917.)

Pitch, as submitted by the Standard Oil Co. of New Jersey, may be transported on steamers carrying passengers. (Ruling, April, 1915.)

Pitch, solid. *See* Solid pitch.

Pixbrite, a liquid metal polish manufactured by Albert Pick & Co., of Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, July, 1924.)

Pluvinox roofing cement may be transported on steamers carrying passengers. (Ruling, August, 1916.)

Police grenade, as manufactured by the Lewis-Hughes Co., Chicago, Ill., or anything like it, shall not be transported on steamers carrying passengers. (Ruling, September, 1922.)

Polish-ol furniture polish may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

Positive seal priming, bituminous solution, boiler and stack paint, Trinidad marine paint No. 1, Trinidad marine paint No. 2, Trinidad marine paint No. 3, Genasco asphaltum varnish structural paint, positive seal damp-proof, black roof paint, Barber brand liquid asphalt-A, and bituminous solution (primer for steel) may be transported on steamers carrying passengers, under the same conditions as spirits of turpentine. Under the provisions of section 4472, Revised Statutes, spirits of turpentine may be carried on steamers carrying passengers, when put up in good metallic vessels or casks or barrels well and securely bound with iron and stowed in a secure part of the vessel. (Ruling, February, 1919.) It is also ruled that if these commodities are contained in tight tin cans which are, in turn, incased in a wooden box, that method of packing will meet the requirements of the law with reference to the commodities being put up in good metallic vessels. (Ruling, March, 1919.)

Potassium bichromate (potassium bi- or di- chromate) may be transported on steamers carrying passengers, without restrictions, when carried as a deck load and packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 50 pounds. (Ruling, October, 1918.)

Potassium chlorate may not be transported in bulk on steamers carrying passengers. In lots of 5 pounds or less, not over 1 pound in a bottle carefully packed and cushioned in separate cases, it may be accepted for transportation. It should not be packed in the same case with other chemicals. Compositions containing potassium chlorate may be accepted for transportation in the same case with ordinary dry inorganic chemicals when the percentage of chlorate is not over, say, 10, and when packed in amounts of not over 1 pound in a bottle, not in more than 5-pound lots, provided the composition contains no other article of like dangerous character, no sulphur, charcoal, or organic compound of any kind, or any other readily oxidizable substance. When the percentage of chlorate is over, say, 10, the regulations governing chlorate of potash should apply and also the restrictions as to admixture of sulphur, charcoal, organic compounds, etc., of the foregoing sentence. (Ruling, November, 1914.) Chlorate of potash, unmixed with combustible matter, can not be considered a like explosive, burning fluid, or like dangerous article to those enumerated in section 4472, Revised Statutes, and accordingly, when properly confined in suitable containers, its transportation on passenger vessels is not prohibited. (Ruling, January, 1915.)

Potassium iodide, solution of, may be transported on steamers carrying passengers when packed with absorbent material, which may be mineral wool, sifted ashes, or infusorial earth. (Ruling, January, 1930.)

Potassium nitrate, saltpeter, nitrate of potash, may be transported on steamers carrying passengers when packed in drums, boxes, or casks and carried as a deck load. (Ruling, October, 1918.)

Potassium perchlorate (perchlorate of potash) shall not be transported on steamers carrying passengers. (Ruling, November, 1929.)

Potassium permanganate may be transported on steamers carrying passengers, when carried as a deck load and when packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 25 pounds. (76253.)

Potassium zanthate may be transported on steamers carrying passengers. (Ruling, March, 1927.)

Preservative shingle stain may be transported on steamers carrying passengers, under the same conditions as turpentine; that is, that it be packed in good metallic vessels or casks or barrels, well and securely bound with iron, and stowed in a secure part of the vessel and marked with name. (Ruling, May, 1923.)

Preservo, manufactured by the Robeson Preservo Co., Port Huron, Mich., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, February, 1926.)

Prest-O-Lite tanks containing acetylene are to be stamped with thickness and tensile strength of the material of which composed, also with the words "Acetylene compressed into porous substance," together with the name of the firm or company by whom the tanks have been charged. The tanks shall be of not less than 55,000 pounds tensile strength to the square inch and of sufficient thickness of shell to withstand a pressure of 1,200 pounds to the square inch, and charged with acetylene to a working pressure not exceeding 240 pounds to the square inch, said tanks to be completely filled with asbestos disks, the porosity of which shall not exceed 80 per cent. (Ruling, March, 1903.) Regulations are complied with if paper labels are pasted on the tanks. (Ruling, May, 1912.)

Presto metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1914.)

Preventol, manufactured by the Haynes Chemical Corporation, New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1921.)

Primer for steel, bituminous solution. *See* Positive seal priming.

Protane bottled gas may be transported on steamers carrying passengers, provided it is transported in containers that comply in all respects with the regulations prescribed by the Interstate Commerce Commission for the transportation of such articles by rail. (Ruling, August, 1927.) Protane bottled gas shall not be used for fuel in galley stoves on vessels coming under the jurisdiction of this service. (Ruling, February, 1929.)

Protexol, formerly known as avenarious carbolineum, may be transported on steamers carrying passengers when packed in tin cases which, in turn, are packed in wooden cases, or when put in bulk in steel drums. (Ruling, October, 1918.)

Prufo metalbrite polish, manufactured by the Prufo Products Co., Portland, Oreg., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, September, 1924.)

Puritan metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, September, 1914.)

Putz liquid polish, Borsum's, when packed in metallic cases, may be transported on steamers carrying passengers. (Ruling, May, 1912.)

Pyralin. *See* Nitrocellulose products.

Pyrene fire-extinguisher fluid in quantities may be transported on steamers carrying passengers, without restriction. (Ruling, August, 1922.)

Pyridine may be shipped on the decks of steamers carrying passengers. (Ruling, April, 1916.)

Pyrofax may be transported on steamers carrying passengers, when contained in cylinders that meet in all respects the requirements of the Interstate Commerce Commission with regard to the transportation of this commodity. (Ruling, March, 1924.)

Pyroxylin plastics. *See* Nitrocellulose products.

Pyxol, a disinfectant, manu actured by the Barrett Manufacturing Co., New York, N. Y., can not be used as stores on any pleasure steamer or steamer carrying passengers but may be transported on steamers carrying passengers, under the same conditions as creosote. (Ruling, November, 1913.)

Quicklime, unhydrated (unslaked), may be transported on steamers carrying passengers, when contained in metal or wooden receptacles, care being taken against hot loading and to protect it from moisture, and provided further that it shall be so stowed as to be able to be easily jettisoned in the event of necessity. This ruling supersedes the ruling as published in Bulletin No. 20, dated June 1, 1917. (Ruling, April, 1926.)

Ramsay's Xtra metal polish and Ramsay's Xtra furniture polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, February, 1918.)

Ranges manufactured by the Universal Bottled Gas Corporation, Rochester, N. Y., and the Stamford Foundry Co., Stamford, Conn., using 7–70 liquefied petroleum gas as fuel, shall not be used in the galleys of vessels coming under the jurisdiction of this Service. (Ruling, May, 1929.)

Rapid paint remover, submitted by the Globe Chemical Co., being noninflammable, may be transported on steamers carrying passengers. (Ruling, May, 1912.)

Rayosol, a liquid metal polish, manufactured by E. W. Bennett & Co., is not a dangerous article as contemplated by section 4472, Revised Statutes, and may be transported on steamers carrying passengers. (Ruling, November, 1912.)

Red Cap metal polish, manufactured by the C. M. Kimball Co., Winthrop, Mass., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, December, 1926.)

Red ebolastic waterproofing compound may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, May, 1922.)

Refrigerating units, complete, using methyl chloride, when properly packed and stowed, may be transported under deck on steamers carrying passengers. (Ruling, March, 1929.)

Reliance marine illuminating oil may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Renown metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, August, 1916.)

Residium of cottonseed oil is not a dangerous article as contemplated in section 4472, Revised Statutes, and it may be transported on steamers carrying passengers. (Ruling, November, 1911.)

Revivo paste metal polish, manufactured by the Heaney Manufacturing Co., Boston, Mass., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Rex nickel polish, manufactured by the Armiger Chemical Co., Chicago, Ill., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, November, 1926.)

Rid, an insecticide, manufactured by the Guarantee Exterminating Co., New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1927.)

Roof coating paint, manufactured by the Ruberoid Co., may be transported on steamers carrying passengers, under the same conditions as spirits of turpentine. (Ruling, February, 1924.)

Roofing cement, general ruling, should have a flash point of not less than 110° F. and a fire point of not less than 110° F., to be transported on steamers carrying passengers. (68490.) Roofing cement that has been approved by the Bureau of Transportation on steamers carrying passengers may be inclosed in rolls of roofing paper and so transported on such steamers. (Ruling, January, 1917.)

Roofing cement. *See* separate rulings on individual cases, according to name.

Roofing or lap cement, Nos. 1051 and 1091, manufactured by The Paraffine Cos. (Inc.), San Francisco, Calif., may be transported on steamers carrying passengers. (Ruling, November, 1929.)

Rosin oil, manufactured by the National Rosin & Size Co., Savannah, Ga., may be transported on steamers carrying passengers, when shipped in substantial tight containers. (Ruling, November, 1920.)

Royal Saxon metal polish, paste and liquid form, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1927.)

Rubber cements may be transported in good, strong, tight barrels on steamers carrying passengers, on deck, convenient for jettison in case of emergency, or if stowed in a properly constructed magazine safely removed from fire. (Ruling, June, 1927.)

Rudensey safety metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, March, 1915.)

Salt cake. *See* Sodium sulphate.

Saltpeter. *See* Potassium nitrate.

S. & F. Colza burning oil may be used as stores on passenger and pleasure steamers and may be transported on passenger steamers. (Ruling, June, 1916.)

Saponified cresol disinfectant, manufactured by the manufacturing laboratory, Pennsylvania Railroad Co., Altoona, Pa., may be transported on steamers carrying passengers, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1929.)

Sassafras oil of camphor having a flash point (by "Tagliabue's Cup Tester") of 200° F. may be transported on steamers carrying passengers. (Ruling, September, 1914.)

Sea clean metal polish, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1926.)

Sella-Todo roofing cement may be transported on steamers carrying passengers. (Ruling, May, 1916.)

Shellac, orange and white, may be transported under the same conditions as varnishes. The ruling with reference to varnishes reads as follows: "Varnishes may be transported on steamers carrying passengers, when packed in accordance with the regulations of the Interstate Commerce Commission. Varnish shall not be stowed in the hold with cotton but, on a ship carrying cotton, should be stowed on deck in such position that it may be easily jettisoned." (Ruling, April, 1926.)

Shellac, orange, standard B compound, shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Shells, high-explosive, shall not be transported on passenger steamers as stores or cargo. (Ruling, November, 1910.)

Shepard fly and insect killer, submitted by the Shepard Chemical Co. (Inc.), New York, N. Y., shall not be transported on steamers carrying passengers, nor shall it be used as stores on pleasure or passenger vessels. (Ruling, September, 1922.)

Shepard's liquid insecticide shall not be transported on steamers carrying passengers, or used as stores on passenger or pleasure steamers. (Ruling, October, 1916.)

Shinola shoe polish paste, when contained in tins packed in well-nailed and iron-strapped wooden cases lined with waterproof paper and stowed in a secure part of the vessel, may be transported on steamers carrying passengers. (Ruling, March, 1912.)

Shinon metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, April, 1919.)

Shi-Nup metal polish, manufactured by the Hirshe Manufacturing Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, December, 1913.)

Shoe filler, manufactured by the Thompson Field Co. (Inc.), Brockton, Mass., may be transported on steamers carrying passengers, care being taken to so stow it as not to be in proximity to excessive heat. (Ruling, November, 1926.)

Shrapnel shells, loaded, with or without fuzes attached or the fuzes apart, shall not be transported on steamers carrying passengers, either as stores or cargo. (Ruling, July, 1915.)

Shur-Brite metal polish, manufactured by the Ensign Products Co., Cleveland, Ohio, may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, December, 1929.)

Signal metal polish, manufactured by the Baltimore Copper Paint Co., Baltimore, Md., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, January, 1928.)

Signet brass and nickel polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, upon routes where there is no other practicable mode of transporting it, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, December, 1914.)

Signet marine metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, January, 1915.)

Signet oil, manufactured by Russian Cement Co., may be used as stores on pleasure and passenger steamers and may be transported on passenger vessels under the same conditions as refined petroleum. (Ruling, August, 1914.)

Silver nitrate may be transported on steamers carrying passengers, when packed in bottles containing not more than 2 pounds, the said bottles being placed in boxes or cases holding not more than 20 or 24 pounds of this commodity, and when packed in this manner may be carried in the hold of the vessel. (Ruling, October, 1918.)

Sla'em, an insecticide manufactured by the Sla'em Manufacturing Co., Baltimore, Md., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, August, 1927.)

Small-arms ammunition. *See* Ammunition, small-arms.

Soap. *See* Naphtha soap.

Soapeze, submitted by the United States Sanitary Specialties Corporation, Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

Sodium arsenate. *See* Arsenic compounds.

Sodium bichromate may be transported on steamers carrying passengers, without restriction, when carried as a deck load and packed in the usual manner followed by the trade, and may be carried in the holds of vessels when contained in packages of not more than 800 pounds. (Ruling, September, 1922.)

Sodium fluoride may be transported on steamers carrying passengers, when packed in suitable tight containers. (Ruling, November, 1917.)

Sodium hydroxide. Same as caustic soda and concentrated lye. *See* Liquid bleach.

Sodium hyposulphite, sodium thiosulphate, may be transported on steamers carrying passengers, without restriction, when packed in the usual manner followed by the trade. (Ruling, November, 1918.)

Sodium, metallic, may be transported on steamers carrying passengers, provided it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn should be packed in water-tight metallic cases securely boxed in a case of sufficient strength to withstand hard usage, and the case must never be stowed where water can reach it, whether from leaky pipes, spray, or any other way, and it is also further provided that the case shall not be stowed in places containing combustible material. (Ruling, November, 1911.)

Sodium nitrate. *See* Nitrate of soda.

Sodium peroxide may be transported on steamers carrying passengers, provided it is packed in perfectly water-tight steel or iron drums of sufficient strength to withstand rough handling, or in water-tight tins, which in turn shall be packed in a water-tight metallic case securely boxed in a case of sufficient strength to withstand hard usage, in accordance with the method as submitted to this service. It is further to be understood that this commodity shall not be stowed in a place containing combustible material and that the case shall be plainly marked, showing that the material that is contained therein is inflammable. (Ruling, April, 1919.)

Sodium sulphate, salt cake, may be transported on steamers carrying passengers. (Ruling, May, 1915.)

Sodium sulphide may be transported on steamers carrying passengers, when contained in bottles holding 1 or 2 pounds each in shipments of mixed chemicals, if surrounded by a sufficient amount of a satisfactory absorbent, such as mineral wool, sifted ashes, or infusorial earth, and larger lots for industrial purposes should be packed in metal drums and carried on deck. (Ruling, April, 1920.)

Sodium sulphide crystals may be transported in 1-pound containers on steamers carrying passengers. (70078–71.)

Sodium thiosulphate. *See* Sodium hyposulphite.

Solarine metal polish, manufactured by the Solarine Co., Chicago, Ill., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, March, 1923.)

Solarine polishing paste may be transported on steamers carrying passengers but shall not be used as stores on passenger or pleasure steamers. (Ruling, August, 1917.)

Solid pitch may be transported on steamers carrying passengers. (Ruling, June, 1918.)

Solidified alcohol. *See* Alcohol.

Solutions of potassium iodide and of manganese chloride may be transported on steamers carrying passengers when packed with absorbent material, which may be mineral wool, sifted ashes, or infusorial earth. (Ruling, January, 1930.)

Special deodorizing fluid, manufactured by the West Disinfecting Co., Long Island City, N. Y., shall not be used as stores on steamers carrying passengers or on pleasure steamers, nor may it be transported on steamers carrying passengers. (Ruling, March, 1921.)

Special Enoz moth liquid. *See* Enoz moth liquid, special.

Spermoline. *See* Oil, mineral colza, etc.

Spic and span metal polish, manufactured by the Atkins Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger steamers. (Ruling, January, 1914.)

Spirits of turpentine. *See* Turpentine.

Spray gas, a household insecticide, manufactured by Egbert & Dirig, New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Squibs, electric. *See* Electric squibs.

Standard asphalt binder "A," submitted by the Standard Oil Co. of New Jersey, may be transported on steamers carrying passengers. (Ruling, April, 1915.)

Stannic chloride may be transported on passenger steamers in 1-pound containers. (70078–71.)

Stays Bright silver paste, manufactured by the Superior Chemical Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, October, 1928.)

Steamship evaporating fluid and steamship deodorizing fluid, manufactured by the West Manufacturing Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, May, 1921.)

Steamship drip fluid, manufactured by the West Disinfecting Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, May, 1921.)

Steamship insecticide (regular and perfumed), submitted by the West Disinfecting Co., New York, N. Y., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, April, 1922.)

Stearns' electric rat and roach paste, manufactured by the Stearns' Electric Paste Co. (Inc.), Chicago, Ill., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels when packed in leak-proof containers. (Ruling, February, 1923.)

Sterno, canned heat, may be transported on steamers carrying passengers, under the same conditions as solidified alcohol. (Ruling, December, 1925.)

Successful autobody and furniture polish, manufactured by the Universal Specialty Co., San Francisco, Calif., may be transported on steamers carrying passengers. (Ruling, March, 1928.)

Successful nickel polish, manufactured by the Universal Specialty Co., San Francisco, Calif., may be transported on steamers carrying passengers without restriction and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1928.)

Sulphate of aluminum not being a like dangerous article to those enumerated in section 4472, Revised Statutes, this service has no jurisdiction concerning its transportation on steamers carrying passengers. (Ruling, November, 1927.)

Sulphate of ammonia. *See* Ammonia sulphate.

Sulphate of copper may be transported on steamers carrying passengers. (Ruling, January, 1917.)

Sulphur, when properly packed, is not prohibited from being carried on passenger steamers. (Ruling, October, 1914.)

Sulphur dioxide, liquid, may be transported on steamers carrying passengers, when contained in steel or iron cylinders capable of withstanding an internal pressure of 450 pounds to the square inch, it being further provided that the cylinders shall be handled without undue jarring, and that they be stored where their temperature can not be raised above 140° F., and that the cylinders be distinctly marked on the outside with the name or description of the article therein. (Ruling, February, 1912.)

Sulphuric acid may be transported on steamers carrying passengers, when packed securely in glass bottles of not more than 5 pints capacity, well cushioned, and separate from all other chemicals, or in small iron drums. Sulphuric acid in 1-pint bottles, but not more than five bottles in one lot, may be shipped in the same case with other chemicals of a similar nature, if surrounded by a sufficient amount of a satisfactory absorbent, such as mineral wool, sifted ashes, or infusorial earth. All such cases should be labeled "Acid." It may be transported in bulk on steamers carrying passengers, when contained in drums or carboys and carried on the decks of such vessels. (Ruling, October, 1918.)

Sulphuric ether shall not be transported on steamers carrying passengers, either as stores or cargo. (Ruling, February, 1913.)

Sun metal polish may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, June, 1915.)

Sunny top metal polish shall not be carried as stores or cargo on passenger steamers. (Ruling, December, 1914.)

Sun-Ray metal polish, manufactured by the Sun-Ray Sales Co., Chicago, Ill., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1926.)

Superphosphate is not prohibited by section 4472, Revised Statutes, from being carried on steamers carrying passengers. (Ruling, December, 1914.)

Superior metal polish can not be used as stores on any pleasure or passenger steamer and may only be transported on steamers carrying passengers, under the same conditions as refined petroleum, on routes where there is no other practicable mode of transporting it. (Ruling, February, 1913.)

Sure pop bedbug liquid, manufactured by Adolph Isaacsen & Son (Inc.), New York, N. Y., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1927.)

Sure pop phosphoric paste, manufactured by Adolph Isaacsen & Son (Inc.), New York, N. Y., may be transported on steamers carrying passengers. (Ruling, October, 1927.)

S. W. disinfectant may be transported on steamers carrying passengers under the same conditions as refined petroleum. (Ruling, May, 1922.)

Sweeping compound, manufactured by the Necessity Co., Boston, Mass., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1924.)

Tartaric acid is not inflammable nor seriously corrosive and may be accepted for transportation when properly packed, in quantities up to 10 pounds, and in the same case with other chemicals when carefully packed and cushioned and inclosed in bottles containing not over 1 pound and not more than five bottles in one case. (40256.)

Taxite paint and varnish remover shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Tertiary amyl alcohol, submitted by the Sharples Solvents Corporation, Philadelphia, Pa., may be transported on steamers carrying passengers under the same conditions as amyl alcohol. (Ruling, March, 1930.)

Tetrachloride of tin in crystals is not a like dangerous article to those that are enumerated in section 4472, Revised Statutes, and can, therefore, be transported on steamers carrying passengers, but your attention is particularly invited to the statements made in paragraph 4 of the report of the Bureau of Standards with reference to the possible corrosive properties, and also the possible danger that might be caused to other commodities; and, therefore, if this commodity is transported on steamers carrying passengers, it would be well to stow it as not to cause danger to other commodities. Paragraph 4 of the report of the Bureau of Standards reads as follows: "The solution of the crystals in water contains free hydrochloric acid, which corrodes iron and steel. The solution might also cause damage to other commodities. However, if the containers are strong and tight, there should be practically no hazard in carrying stannic chloride crystals." (Ruling, January, 1924.)

Texaco liquid roofing cement may be transported on steamers carrying passengers. (Ruling, November, 1917.)

Texaco roofing cement shall not be transported on steamers carrying passengers. (Ruling, September, 1917.)

Texaco Texacoat, manufactured by the Texas Co., New York, N. Y., may be transported on steamers carrying passengers, when shipped in perfectly tight containers. (Ruling, August, 1920.)

The Porter's Friend metal polish, manufactured by the North American Polish Co., Cleveland, Ohio, may be transported on steamers carrying passengers without restriction and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1928.)

Thermit may be transported on steamers carrying passengers, when contained in paper bags, packed in wooden boxes, properly and firmly secured. (Ruling, September, 1915.)

Thermoline gas may be transported on steamers carrying passengers, when contained in cylinders that meet the requirements of the Interstate Commerce Commission, particular care also being taken to stow these cylinders in such manner that they will not be subjected to heat. (Ruling, October, 1917.)

Theroz, manufactured by the Theroz Co., New York, N. Y., may be transported on steamers carrying passengers, when packed in air-tight metal containers. (Ruling, November, 1920.)

Tocoseal roofing cement may be transported on steamers carrying passengers. (Ruling, May, 1916.)

Toluol shall not be transported as stores or cargo on steamers carrying passengers. (Ruling, September, 1914.)

Toxal, manufactured by the Glidden Co., Reading, Pa., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. This commodity shall not be used as stores on pleasure or passenger vessels. (Ruling, November, 1923.)

Trinidad asphalt roofing cement may be transported under the same conditions as refined petroleum on steamers carrying passengers upon routes where there is no other practicable mode of transporting it. (Ruling, January, 1912.)

Trinidad flux may be transported without restriction on steamers carrying passengers. (Ruling, August, 1914.)

Trinidad Lake asphalt, handled by the Barber Asphalt Paving Co., may be transported on steamers carrying passengers, without restrictions. (Ruling, April, 1921.)

Trinidad liquid asphalt "A" and "B" may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, August, 1914.)

Trinidad marine paint, Nos. I, II, III. *See* Positive seal priming.

Trinitrotoluol shall not be transported as stores or cargo on steamers carrying passengers. (50557.)

Tube patching outfits, sizes Nos. 2 and 3, manufactured by the B. F. Goodrich Co., shall not be transported on steamers carrying passengers. (Ruling, February, 1926.)

Tube repair kit, manufactured by the Goodyear Tire & Rubber Co., Akron, Ohio, shall not be transported on steamers carrying passengers. (Ruling, July, 1922.)

Turpentine, oil, and spirits of, to be carried on passenger steamers, must be packed in good metallic vessels or casks or barrels, well and securely bound with iron and stowed in a secure part of the vessel and marked with name. (R. S.)

Turpentine substitute may be transported on steamers carrying passengers, under the same conditions as turpentine; that is, that it shall be packed in good metallic vessels or casks or barrels, well and securely bound with iron and stowed in a secure part of the vessel and marked with name. (Ruling, May, 1923.)

Twinkle metal polish, manufactured by the Twinkle Polish Co., Brooklyn, N. Y., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, December, 1926.)

Type dross. *See* Lead dross.

Uncle Hiram's brighten-all polish may be used as stores on passenger or pleasure steamers. (Ruling, February, 1916.)

Unhydrated (unslaked) lime. *See* Quicklime.

Universal metal polish paste (Porsum's) may be transported on steamers carrying passengers, when properly packed in metallic cases. (49473.)

Universal shine metal polish, as manufactured by the Universal Specialty Co., San Francisco, Calif., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger vessels. (Ruling, January, 1923.)

Universal polishing paste, when packed in metallic cases, may be transported on steamers carrying passengers. (Ruling, May, 1912.)

Universal thinner shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Usanco may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on pleasure or passenger vessels. (Ruling, April, 1925.)

U. S. metal polish may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (Ruling, January, 1916.)

Valerianic ether, a fruit ether, manufactured by George Lueders & Co., New York, N. Y., shall not be transported on steamers carrying passengers. (Ruling, July, 1929.)

Valgrinok noninflammable marine metal polish and Valgrinok paste may be transported on steamers carrying passengers and may be used as stores on passenger or pleasure steamers. (Ruling, July, 1919.)

Valspar, brushing lacquer, shall not be transported on steamers carrying passengers. (Ruling, August, 1927.)

Varnishes may be transported on steamers carrying passengers, when packed in accordance with the regulations of the Interstate Commerce Commission. The Supervising Inspector General, in a letter to the United States Shipping Board, dated August 19, 1919, advises that varnish shall not be stowed in the hold with cotton, but on a ship carrying cotton, should be stowed on deck in such position that it may be easily jettisoned. (46991.)

Varnish solvent, as manufactured by the Royal National Varnish Co., may be transported on steamers carrying passengers, under the same conditions as refined petroleum. (Ruling, August, 1923.)

Vegetable creosote, beechwood, may be transported on steamers carrying passengers. (Ruling, December, 1918.)

Venus bronzing liquid, manufactured by the United States Bronze Powder Works, Closter, N. J., may be transported on steamers carrying passengers under the same conditions as varnishes. (Ruling, July, 1929.)

Vermicide may be transported on steamers carrying passengers and may be used as stores on passenger and pleasure steamers. (This reverses in part previous ruling.) (Ruling, February, 1916.)

Verm-O-Spray, manufactured by the Verm-O-Spray Products Co., West Haven, Conn., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, May, 1923.)

Vim waterproof belt cement, manufactured by E. F. Houghton Co., Philadelphia, Pa., shall not be transported on steamers carrying passengers. (Ruling, July, 1925.)

Viscoloid. *See* Nitrocellulose products.

Vitrifyx may be transported on steamers carrying passengers, when contained in strong wooden barrels. (Ruling, October, 1917.)

Volck ortho spray, manufactured by the California Spray Chemical Co., Los Angeles, Calif., may be transported on steamers carrying passengers, without restriction. (Ruling, March, 1930.)

Vulcanizing cement shall not be transported on steamers carrying passengers. (Ruling, June, 1922.)

Vulca patch shall not be transported on steamers carrying passengers. (Ruling, April, 1920.)

Wachtel's liquid cream metal polish, manufactured by The Wachtel Chemical Co., Cleveland, Ohio, may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1930.)

Walnut-oil stain shall not be transported on steamers carrying passengers. (Ruling, May, 1922.)

Warren-Ehret Co. roofing cement, having a flash and fire point of not less than 239° F., may be transported on steamers carrying passengers. (Ruling, November, 1915.)

Waterproof linoleum cement, manufactured by the Atlas Supply Co., Philadelphia, Pa., having a flash and fire point of 59° F., shall not be carried on passenger steamers as stores or cargo. (68490–2 and Ruling, May, 1915.)

Welding compound. *See* Thermit.

Welsbach electric refrigerators, using alcozol (ethyl chloride) as a refrigerant, shall not be transported on steamers carrying passengers. (Ruling, March, 1928.)

White duco paint may be transported on steamers carrying passengers under the same conditions as varnishes. (Ruling, May, 1928.)

White metal polish, manufactured by the C. M. Kimball Co., Winthrop, Mass., may be transported on steamers carrying passengers, without restriction, and may be used as stores on pleasure or passenger vessels. (Ruling, January, 1927.)

Whiz aluminum polish and Whiz metal polish, as at present manufactured by the R. M. Hollingshead Co., Camden, N. J., may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, June, 1926.)

Whiz all-rubber patch outfit, manufactured by the R. M. Hollingshead Co., Camden, N. J., shall not be transported on steamers carrying passengers. (Ruling, October, 1924.)

Whiz-Fly-Fume, manufactured by the R. M. Hollingshead Co., Camden, N. J., may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on pleasure or passenger vessels. (Ruling, October, 1928.)

Wilson signal oil may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure steamers. (Ruling, March, 1916.)

W. L. and Q. brass polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but it shall not be used as stores on passenger or pleasure steamers. (Ruling, August, 1915.)

W. Oil 600° may be used as stores on pleasure or passenger steamers and may be transported on steamers that carry passengers. (Ruling, April, 1916.)

Wright's silver cream polish may be transported on steamers carrying passengers and may be used as stores on pleasure or passenger vessels. (Ruling, March, 1922.)

Wunderbrite metal polish may be transported on steamers carrying passengers, under the same conditions as refined petroleum, but shall not be used as stores on passenger or pleasure vessels. (Ruling, September, 1926.)

Xylonite. *See* Nitrocellulose products.

Zenith instant polish, manufactured by the Zip Manufacturing Co., Seattle, Wash., may be transported on steamers carrying passengers and may be used as stores on pleasure and passenger steamers. (Ruling, January, 1914.)

Zinc dust may be carried on steamers carrying passengers, if contained in hermetically sealed zinc-lined packages, or packages lined with tin plate or terneplate. (Rulings, September and November, 1914.)

Zing cleansing compound, manufactured by the O. G. W. Corporation, Boston, Mass., shall not be transported on steamers carrying passengers and shall not be used as stores on pleasure or passenger vessels. (Ruling, June, 1923.)

Zobelin, a disinfectant, manufactured by the Ernst Zobel Co., Brooklyn, N. Y., may be transported on steamers carrying passengers, without restriction, except that it shall be shipped in absolutely tight containers. (Ruling, November, 1920.)

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